

Massachusetts

Holt Math **Test Prep Workbook** **for Grade 8**

Help for the MCAS

HOLT, RINEHART AND WINSTON

Holt Math

Massachusetts Test Prep Workbook for Grade 8



HOLT, RINEHART AND WINSTON

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To the Student

This book will help you prepare for the Mathematics section of the Eighth-Grade Massachusetts Comprehensive Assessment System (MCAS) test.

This book contains questions like the ones in the test you will take, and 2 sample tests that look like the one you will take.

The Massachusetts Department of Education's website <http://www.doe.mass.edu/mcas/about1.html> provides information you may find helpful before taking the MCAS test.

About the Test Prep Book

The practice questions in this book are organized by strands. There are 5 strands:

- Number Sense and Operations
- Patterns, Relations, and Algebra
- Geometry
- Measurement
- Data Analysis, Statistics, and Probability

Within each strand, there are several 2-page worksheets on each topic.

At the back of the book, the practice tests contain additional practice questions in order to get used to working in a timed situation.

In addition to the practice in this book, your textbook has many opportunities to practice questions in the format of the MCAS, as well as practice tests and test-taking strategies.

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MCAS in Brief

Question Type	Multiple Choice, Short-answer, Open-response
Length of Test	60 min. / Two sessions
Number of Questions	<ul style="list-style-type: none"> • 29 multiple choice • 5 short-answer questions • 5 open-response questions
Materials allowed	<ul style="list-style-type: none"> • Pencils • Calculators allowed only during session 2 • reference sheet and MCAS ruler will be provided

Standardized Test-Taking Strategies for Math

Standardized tests, such as the MCAS, are designed in order for you to demonstrate the content and skills you have learned. It is important to keep in mind that, in most cases, the best way to prepare for these tests is to pay close attention in class and take every opportunity to improve your mathematical, reading, and writing skills.

Tips For Taking The Test

Throughout the year

- Keep up with your homework. Homework is important practice that will help you learn the skills you need for the test. Practice will also help you answer questions more quickly, leaving more time for the difficult questions.
- Review your notes, homework, and tests on a regular basis to make sure that you maintain the skills you learned earlier in the year.
- Use flashcards to learn important formulas and vocabulary words. If you can, memorize formulas to save time on the test.
- Familiarize yourself with the format and content of the test.
- Make a timeline for reviewing materials in the time leading up to the test. Do not try to “cram” the night before the test.
- Practice without your calculator, because you will not be allowed to use a calculator on the test.

Before the test

- Be sure you are well rested.
- Eat a good breakfast.
- Be on time, and be sure that you have the necessary materials.
- Be sure to bring any assistive device that you need, such as glasses or a hearing aid.
- Try not to miss class the day before the test. Your teacher may be reviewing important content.

During the Test

- Listen to the instructions of the teacher. It's easy to miss important points that can affect your score.
- Read the directions carefully. If you do not understand a direction, raise your hand and ask for clarification immediately.
- Use your scratch paper. You are more likely to make a mistake when doing a problem in your head. You can also use your written work to help check your answer. Circle the answer and write the problem number next to your work so you can find it while you are reviewing your test.
- Read the entire question, including all answer choices, and think about your answer before you make any marks on the answer sheet.
- Fill in the circle for each answer carefully and completely. Erase any stray marks on the page. If you change an answer choice, be sure to erase completely and carefully so that you do not tear a hole in the answer sheet.
- Make sure the number on the answer document matches the question number in the test booklet.
- Don't spend too much time on any one question. If you cannot answer a question right away, fill in your best choice. If you have time at the end of the test, return to any questions you are unsure of.
- If questions contain negative wording such as NOT, read them carefully and be alert for the use of double negatives within a sentence.
- Understand the format of the test so that you can gauge your time according to what section of the test you are taking.
- If you finish early, review the test and make sure the answer sheet is filled out correctly. Remember, your first answer is usually the correct one, so don't change an answer unless you can convince yourself that your original choice is wrong. Try solving the problem in a different way to see if you get the same answer.
- **DON'T STRESS!** Just remember what you have learned in class, and you should do well.

Tips for Answering Multiple-Choice Questions

- If there is a figure accompanying the question, review the figure carefully. Read the labels and make sure you understand what the figure represents. Remember, a figure may not be drawn to scale.
- If there is not a figure, it may be helpful to draw one on your scratch paper using the information provided.
- Read the multiple-choice question first for its general intent and then reread it carefully, looking for words that give clues or can limit possible answers to the question.
- If possible, work the question before looking at the answer choices. Then look for your answer among the given choices. If your answer is not one of the choices, read the question again. Be sure that you understand the problem. Remember, common errors are often used to generate incorrect answer choices. Be sure you work carefully.
- Make sure you answer the question being asked. A partial answer to the question may be used as an incorrect answer choice.
- Always read **all** of the possible answer choices—even if the first one seems like the correct answer. There may be a better choice farther down in the list.
- Think of what you already know about the math topic involved and use that information to help eliminate answer choices. You can also use estimation to eliminate answer choices.
- If you cannot work the question, you may be able to substitute the answer choices back into the question to find the correct choice. Start with the middle value. If the result is too large, then substitute a smaller value. If the result is too small, then substitute a larger value.
- Never leave a question blank. There is no penalty for guessing, so always choose an answer.
- When you are finished, reread the question and the selected answer to be sure that you made the best choice and that you marked it correctly on the answer sheet.

Strategies for Success

There are various strategies you can employ ahead of time to help you feel more confident about answering questions on math standardized tests. Here are a few suggestions:

1. VISUALS

Note the labels on the charts and graphs. For example, a scale on one axis may provide a valuable clue. Read all graphs twice.

When reading diagrams, read all labels and tick marks carefully, and read diagrams twice, also.

Label the figure with any information stated in the problem that is not in the diagram. Use the properties of the figure, for example, if it is stated that a figure is a square, you can label all the sides with the same length.

If a figure is not provided, it may be helpful to draw one. Be sure that you do not assume any information that is not included in the problem. Remember, the figure does not have to look perfect. It is only to help you understand the relationships in the problem.

2. CONCEPTS

When answering questions about math concepts, don't let a hard question stump you. You can always work with what you do know. It's possible to answer a question when you know only a part of the concept being tested.

Another strategy to help you on difficult questions is to draw or sketch out the question's concept. Often you can understand how to answer a question by listing what you know, sketching the process, and then identifying what you are supposed to solve.

If you do not understand a problem on the test, try to relate it to a problem you can solve. For example, you can substitute simpler numbers into a problem and figure out how to solve it. Then try again with the original values in the problem.

3. MATH SKILLS

To help you on the math sections of the tests, practice the skills as you are reading and discussing your textbook. For example, you could put the steps to a process in order in your mind. Also, sequencing a process can become a game you play with a friend who also has to take the test. Always ask yourself what the most important points are when studying sections. Some of the more common skills for studying math are

- **Analyzing Information**—the process of breaking something down into its parts and examining the relationships between them. Analyzing enables you to better understand the whole.
- **Sequencing**—the process of placing the steps in a process in order to better understand the steps and the process as a whole. When you analyze the sequence, you are determining what happens first, second, and so on.
- **Categorizing**—the process by which you group things together by the characteristics they have in common. Categorizing helps you to make comparisons and see differences among things.
- **Identifying Cause and Effect**—interpreting the relationships between events. A *cause* makes something happen. An *effect* is what happens as a result of the cause.
- **Comparing and Contrasting**—the process of examining situations or ideas, etc., for their similarities and differences.
- **Summarizing**—the process of taking a large amount of information and boiling it down into a short clear statement. To *summarize* a problem, you must analyze the problem to find the most important points and the supporting information.
- **Paraphrasing**—a paraphrase is a restatement of someone's ideas or words. A paraphrase is usually about as long as the original; the ideas are just expressed in simpler terms. A paraphrase question might be stated like this, "According to the passage, which of these statements is accurate?"
- **Visualizing**—visualizing helps you see processes and procedures in your mind's eye. Visualizing will help you be successful on a variety of math questions you could encounter on tests.

4. READING MATH

First, remember that what you have learned about math can help you in answering comprehension questions on tests. Also, though, remember the following points:

- Read the problem as if you were not taking a test.
- Look at the big picture. Ask yourself questions like, *What is the question being asked? What do the diagrams or graphs tell me?*
- Read the problem quickly first. This technique will help you know what information to look for as you read.
- Reread the problem and underline information related to the questions.
- Go back to the question and try to answer it in your mind before looking at the answers.
- Read all the answer choices and eliminate the ones that are obviously incorrect.
- If you can eliminate certain answers, getting the choice down to two, go ahead and pick one of the two responses. That's an educated guess, and you are most likely better off making the choice.

Analyzing Word Problems

Many students who are comfortable with basic skill problems are still stumped by word problems. These steps will help you work through word problems on standardized tests.

Step 1 Understand the problem

Read the problem carefully and make sure you understand what is being asked. You may wish to rewrite the question in your own words.

List the given information or circle it in your test booklet, if you are allowed to write in it. Cross out any unnecessary information.

Step 2 Make a plan

Think about similar problems you have seen in the past, and how you solved them.

Determine a strategy or strategies that you will use to solve the problem, such as drawing a diagram, working backward, finding a pattern, or other problem-solving strategies.

Step 3 Solve the problem

Solve the problem according to your plan. If the strategy you chose is not working, go back and revise. Write out all the steps on your scratch paper to avoid making careless mistakes.

Step 4 Look Back

Make sure you answered the question that was asked.

Check your answer in the words of the problem to make sure your answer is reasonable.

Make sure your answer is in the correct place on the answer document.

Learning Math Vocabulary

Learning vocabulary is important in order to be successful on standardized tests. During the test, you will not be able to ask the meaning of a word, and you may not be able to answer a question that contains a word you do not know.

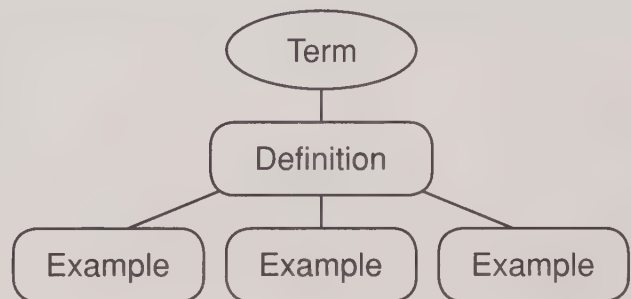
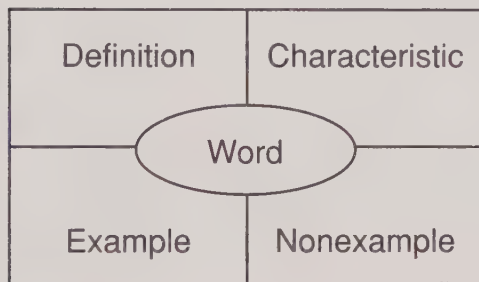
Spend time learning vocabulary throughout the year so that you are prepared for your test when the time comes.

Identify important terms:

As you learn new concepts, keep a list of unfamiliar terms. Also, review the standards for your grade and write down any words you do not know.

Learn the meaning of each term:

Look up the meaning of each new word in your glossary. It may help to use the Vocabulary Questioning Strategies shown on the next page. Another way to learn vocabulary is by using graphic organizers like the ones shown below.



Memory aids:

Your lists of words may be used as memory aids, or it may be helpful to create flashcards with the term on the front and the definition and/or examples on the back. Review the flashcards frequently. As you learn the words, you may remove the flashcards from your stack, but keep them for occasional review before your exam.

Use context clues:

If you do encounter an unfamiliar word on your test, don't panic. Try to relate it to a familiar word or use context clues to determine the meaning of the word in the problem.

Vocabulary Questioning Strategies

Vocabulary term _____

Before you look up the word, predict its meaning. Some clues you can use are as follows:

- the way you have seen or heard the word used
- the everyday meaning of the word
- the meaning of the root word, prefix, or suffix

I think this word means _____

Look up the word in your glossary, and write its meaning here.

Write a question in your own words that contains the vocabulary term, and write the answer.

Question: _____

Answer: _____

Think of a strategy to remember the meaning of the word. Some possible strategies are as follows: draw a picture that represents the word, write a poem or song about the word, or relate the math meaning to the everyday meaning of the word. Write your strategy here.

Math Anxiety

Math anxiety is a term used to describe fear and negative attitudes about working with numbers and taking math tests. Here are some suggestions to help alleviate math anxiety.

- Motivate yourself to learn math. Math class can be challenging, but it also has many rewards. Mathematics is a useful tool with a wide range of applications in nearly every field, as well as everyday life.
- Talk to your teacher about your anxiety. He or she may have suggestions or be able to help in other ways.
- Go to class every day! Research shows a strong correlation between attendance and math grades. Attending class should be a high priority.
- Make the most of your class time. Warm up for class by looking over the previous day's notes and homework. Write out any questions you have. If possible, read ahead in the text. Be alert and attentive. You won't get much benefit out of sleeping through class.
- Ask questions in class. If you just decide you can figure something out later, you may not understand the rest of the lecture, and fall further behind. Most often others will have the same question.
- Develop a note-taking system. If you are too busy writing every word the teacher says, you will not have time to comprehend much. Use abbreviations and shorthand during class, and re-work or re-write your notes soon after class to make sure you understand what was said.
- Do your homework as soon after class as possible. The longer you wait, the more you may forget. If you get behind, you will have a harder time understanding further material, and you may become frustrated.

- Find a study partner or group to work with. This will make math a more comfortable activity, maybe even fun!
- Find a place you are comfortable studying, where there are few distractions. If you have a certain place set aside for studying, you will find it easier to get into the right frame of mind to study there.
- Take breaks while studying. The mind works best in short periods of time, between 20 and 45 minutes. When you can't concentrate, take 5–10 minutes to walk around, stretch, or have a snack, then return to your work refreshed.
- Get help when you are stuck. Don't agonize for hours, ask your teacher, a tutor, a classmate, or a friend for help.
- Make a vocabulary list and a formula list. Use flashcards to memorize definitions and formulas. Remember, math is like a foreign language. You can't speak it if you don't know the words.
- To solidify your understanding, after you have done your homework, try the following:
 - Check your answers against the answers in the back of the book.
 - Do some extra problems from the book in areas you had trouble.
 - Make up some practice problems and work them.
 - Write out a general step-by-step procedure for solving each type of problem.
- Learn relaxation techniques and practice them before the test so that if you get frustrated you will be able to relax during the test.
- Learn more about math anxiety in books or on the Internet. Many people have math anxiety, and there are a lot of resources out there.

Troubleshooting

Taking practice tests can be helpful, but you will get more out of them if you analyze the tests after they have been scored to see where you made mistakes. Look at the table below to see some common types of mistakes. Use the blank rows to add in your own types with how you can avoid them in the future.

Type of mistake	Ways to avoid it in the future
I was unfamiliar with the concept involved in the question.	Review the standards to make sure I know what will be covered on the test.
I knew how to do the problem, but I couldn't remember.	Maintain skills throughout the year. Review old tests and homework to keep old topics fresh.
I misread the problem.	Read the problem carefully, and check my answer against the words of the problem to make sure the answer makes sense.
I did not know the meaning of a word in the problem.	Make lists of vocabulary terms and use vocabulary strategies to learn their meanings.
I did not transfer the answer to the answer sheet correctly.	Check frequently that the answers are in the right place. Circle the answer in the answer booklet or on scratch paper so I can go back and check it.

NUMBER SENSE AND OPERATIONS**Classify Real Numbers**

8.N.8 Demonstrate an understanding of the properties of arithmetic operations on rational numbers. Use the associative, commutative, and distributive properties; properties of the identity and inverse elements (e.g., $-7 + 7 = 0$; $\frac{3}{4} \times \frac{4}{3} = 1$); and the notion of closure of a subset of the rational numbers under an operation (e.g., the set of odd integers is closed under multiplication but not under addition).

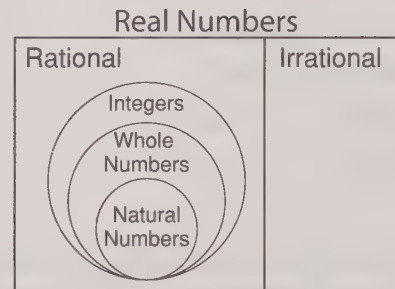
Select the best answer for each question.

- 1** Which of the following is an irrational number?
- A. π
 - B. 5
 - C. 6.07
 - D. $\frac{14}{2}$
- 2** To which of the following subsets does the number 4.02 belong?
- A. whole numbers
 - B. natural numbers
 - C. rational numbers
 - D. irrational numbers
- 3** Which of the following is a rational number? Assume the pattern of digits continues in each number.
- A. 1.212112111...
 - B. 2.468101214...
 - C. 7.454545454...
 - D. 1.123581321...

- 4** Which of the following is an irrational number?

- A. $\sqrt{16}$
- B. $\sqrt{49}$
- C. $\sqrt{225}$
- D. $\sqrt{300}$

Use the Venn Diagram below to answer questions 5–6.



- 5** Which of the following statements is true?
- A. All rational numbers are whole numbers.
 - B. All natural numbers are whole numbers.
 - C. All integers are whole numbers.
 - D. All irrational numbers are whole numbers.

6 Which of the following statements is true?

- A. Natural numbers can be either rational or irrational.
- B. All rational numbers are integers.
- C. The set of irrational numbers is a subset of the set of integers.
- D. The set of integers is a subset of the set of rational numbers.

7 Which is an irrational number?

- A. $\sqrt{5}$
- B. $\sqrt{9}$
- C. -1
- D. $-\frac{3}{7}$

8 An integer must also be which type of number?

- A. natural number
- B. whole number
- C. rational number
- D. irrational number

9 Greg used the Pythagorean Theorem to find the length of the hypotenuse of a right triangle. The length of the hypotenuse was $\frac{2\sqrt{16}}{4}$ inches. This value can be classified as what type of number?

- A. irrational
- B. whole
- C. negative integer
- D. decimal

Short-Response: Show your work for each question.

10 The distance from Earth to the Sun is about 9.3 $\times 10^7$ miles. Is this a rational or irrational number? Explain your answer.

11 The distance from home plate to second base is $90\sqrt{2}$ feet. Is this number a rational or irrational number? How do you know?

12 Classify 1.88 as irrational or rational. Justify your classification.

Extended-Response: Show your work for each question.

13 A student wrote that $\frac{\sqrt{2}}{2}$ is a rational number because it can be written as a fraction. Is the student correct? Explain why or why not.

NUMBER SENSE AND OPERATIONS**Factors and Multiples**

8.N.5 Apply number theory concepts, including prime factorization and relatively prime numbers, to the solution of problems.

Select the best answer for each question.

- 1 What is the greatest common factor of 36, 81, and 144?
- A. 9 C. 18
B. 12 D. 24
- 2 Which shows the prime factorization of 126?
- A. $2 \times 3 \times 7$
B. $2^2 \times 3 \times 7$
C. $2 \times 3^2 \times 7$
D. $2^2 \times 3^2 \times 7$
- 3 What is the least common multiple of 8, 12, and 15?
- A. 120
B. 360
C. 720
D. 1,440
- 4 Which list contains the common factors of 324 and 504?
- A. 0, 2, 3, 5
B. 1, 2, 3
C. 2, 3, 7
D. 2, 3, 4, 5

- 5 Jane baked the kinds of fruit bars shown in the table.

Kind of Fruit Bar	Number
Apple	51
Peach	34
Plum	85

Jane wants to make baskets of fruit bars, and she wants to divide each kind of fruit bar equally among the baskets. How many baskets can she make?

- A. 17
B. 18
C. 19
D. 20
- 6 Which is a common multiple of 18 and 8?
- A. 8
B. 438
C. 864
D. 1,000
- 7 The Gateway Arch in St. Louis is 630 feet tall. What is the prime factorization of that number?
- A. $2 \times 3^2 \times 5 \times 7$
B. $2^2 \times 3^2 \times 7$
C. $2^2 \times 3 \times 5 \times 7$
D. $2 \times 3^2 \times 7$

- 8 A new sports car produces 420 horsepower. A new truck produces 450 horsepower. Which list shows some common factors of these two numbers?

A. 0, 2, 7 C. 0, 1, 2, 7
B. 2, 3, 7 D. 2, 3, 5

- 9 Which of the following numbers is a perfect square?

A. 200 C. 600
B. 400 D. 800

- 10 Which of these numbers represents a whole number?

A. $\sqrt{44}$ C. $\sqrt{96}$
B. $\sqrt{56}$ D. $\sqrt{144}$

Short-Response: Show your work for each question.

- 11 Name a prime number greater than 50. Justify your answer.

- 12 Name a perfect square greater than 100. Justify your answer.

- 13 Two numbers have exactly one common factor besides 1. Explain why the common factor must be a prime number.

- 14 For the following list of numbers, indicate whether each is prime or composite by placing a P or C over the number.

2, 3, 5, 19, 49, 61, 85, 121, 153

- 15 For each number in the chart find the square of the number and the square root of the number.

Number	Square	Square Root
4		
9		
16		
25		
100		

- 16 List each whole number 1 through 25 into one or more of the four columns below.

Prime	Composite	Perfect Square	None

Extended-Response: Show your work for each question.

- 17 Jen and Sue are both trying to find the least common multiple of 18 and 24. So far, they have written the following:

Jen: 18, 36, 54, 72, 90, 108, 126, ...

24, 48, 72, 96, 120, 144, ...

Sue: $18 = 2 \cdot 3 \cdot 3$

$24 = 2 \cdot 2 \cdot 2 \cdot 3$

Explain how each person would find the least common multiple.

NUMBER SENSE AND OPERATIONS

Compare and Order Rational Numbers

8.N.1 Compare, order, estimate, and translate among integers, fractions and mixed numbers (i.e., rational numbers), decimals, and percents.

Select the best answer for each question.

- 1 Which temperature is between 8°F and 212°F ?
 A. 214°F C. 10°F
 B. 29°F D. 12°F
- 2 Which numbers are in order from least to greatest?
 A. $-\frac{1}{3}, -\frac{4}{9}, \frac{3}{8}, -\frac{5}{6}$
 B. $-\frac{5}{6}, -\frac{1}{3}, -\frac{4}{9}, \frac{3}{8}$
 C. $-\frac{1}{3}, -\frac{4}{9}, -\frac{5}{6}, \frac{3}{8}$
 D. $-\frac{5}{6}, -\frac{4}{9}, -\frac{1}{3}, \frac{3}{8}$
- 3 The table shows the population of four states according to the 2000 Census.

State	Population (in millions)
Arkansas	2.673
Iowa	2.926
Kansas	2.688
Texas	20.852

Which shows the states in order from the greatest to the least population?

- A. Texas, Kansas, Iowa, Arkansas
- B. Iowa, Kansas, Arkansas, Texas
- C. Iowa, Texas, Kansas, Arkansas
- D. Texas, Iowa, Kansas, Arkansas

- 4 According to the 2000 U.S. Census, at least 1 but fewer than 7 out of every 100 people in the United States were under the age of 5. Which could be the percentage of the U.S. population under the age of 5?
 A. 0.68% C. 68%
 B. 6.8% D. 680%

- 5 A meteorologist records how many inches above or below the average monthly rainfall a location receives every month. The table shows the data for four months in one city.

Month	Rainfall Difference
May	1.25
June	-1.75
July	0.625
August	-2.5

Which shows these measurements in order from least to greatest?

- A. -1.75, -2.5, 0.625, 1.25
- B. -2.5, -1.75, 0.625, 1.25
- C. -1.75, -2.5, 1.25, 0.625
- D. 0.625, 1.25, -1.75, -2.5

- 6 Darla spent the following amounts for groceries: \$52.86, \$65.41, \$37.15, and \$88.67. Which statement is true?

A. She spent more than \$250.00.
B. She spent exactly \$250.00.
C. She spent less than \$245.00.
D. She spent between \$245.00 and \$250.00.

- 7 Which list of numbers is in order from least to greatest?

A. $\frac{5}{6}, -\frac{3}{4}, -\frac{2}{3}, \frac{1}{2}$
B. $-\frac{3}{4}, -\frac{2}{3}, \frac{1}{2}, \frac{5}{6}$
C. $-\frac{2}{3}, -\frac{3}{4}, \frac{1}{2}, \frac{5}{6}$
D. $-\frac{3}{4}, -\frac{2}{3}, \frac{5}{6}, \frac{1}{2}$

- 8 A grocery store sells boxes of cereal in different weights. Which shows the weights of the boxes in pounds from least to greatest?

A. $\frac{13}{8}, 1.49, \frac{17}{12}$ C. $\frac{17}{12}, \frac{13}{8}, 1.49$
B. $\frac{17}{12}, 1.49, \frac{13}{8}$ D. $\frac{13}{8}, \frac{17}{12}, 1.49$

- 9 According to the U.S. Bureau of the Census, in 1860 at least 1 but fewer than 3 out of every 100 people in the United States were 65 or older. Which could be the percentage of the U.S. population in 1860 that was 65 or older?

A. 0.27% C. 27%
B. 2.7% D. 270%

- 10 Which of the following numbers is between 35% and 50%?

A. $\frac{1}{5}$ C. $\frac{2}{5}$
B. $\frac{1}{3}$ D. $\frac{11}{20}$

Short-Response: Show your work for each question.

- 11 Name a temperature that is between 10°F and 25°F .

- 12 Ezra collected some rocks for a rock garden. The rocks weighed 13.05, 13.55, 13.055, and 13.5 kilograms. Write the weights of the rocks in order from greatest to least.

- 13 Kelly's computer contains files that use 2.706 kilobytes, 2.570 kilobytes, 2.079 kilobytes, and 2.507 kilobytes of space on her hard drive. Write the files in order from the smallest to the largest. Explain your answer.

Extended-Response: Show your work for each question.

- 14 Graph the integers $\{-23, -24, -18, -3\}$ on a number line. Explain how you would use the number line to order the integers from least to greatest.

- 15 Abe wanted to order the list of rational numbers $\left\{\frac{1}{3}, \frac{7}{12}, \frac{3}{8}, \frac{5}{6}\right\}$ from least to greatest. First, he multiplied all of the numbers by 24. Explain why he did this, and how he finished ordering the list.

NUMBER SENSE AND OPERATIONS**Estimation****8.N.11** Determine when an estimate rather than an exact answer is appropriate and apply in problem situations.**Select the best answer for each question.**

- 1** Which of the following shows that the calculation below is not reasonable?

$$32.5 \cdot 79.8 = 259.35$$

- A. $32.5 \cdot 79.8 = 1,800$
- B. $30 \cdot 80 = 0.0024$
- C. $30 \cdot 80 = 240$
- D. $30 \cdot 80 = 2,400$

- 2** Which of the following is the best estimate of a solution to the problem below?

A glass container can hold 100 fluid ounces of water. It now has 43.9 fluid ounces in it. What is the greatest amount of water that can be poured into the container without it overflowing?

- A. about 40 fluid ounces
- B. about 55 fluid ounces
- C. about 60 fluid ounces
- D. about 140 fluid ounces

- 3** Mr. Lancaster drove 549 miles. The trip took 10 hours. Estimate his average speed in miles per hour.

- A. 40 miles per hour
- B. 50 miles per hour
- C. 55 miles per hour
- D. 60 miles per hour

- 4** Which is the best estimate of $\frac{7}{8} - \frac{2}{3}$?

- A. $\frac{1}{24}$
- B. $\frac{1}{5}$
- C. $\frac{1}{3}$
- D. $\frac{1}{2}$

- 5** Fran has \$6.00 in her pocket. She is considering buying items from the list below. Which items can she be sure she can afford without using a calculator to find out?

- A. program and salad
- B. salad, drink, and sandwich
- C. salad and sandwich
- D. program and drink

- 6** One container holds 45.6 liters of liquid. Another container holds 19.8 liters of the same liquid. What is the best estimate of the difference in the contents of the two containers?

- A. 5 liters
- B. 20 liters
- C. 25 liters
- D. 65 liters

- 7 Which of the following shows that the calculation below is reasonable?

$$155.54 \div 15.4 = 10.1$$

- A. $10 \cdot 15 = 1,500$
- B. $200 \cdot 20 = 10$
- C. $150 \cdot 15 = 2,250$
- D. $150 \div 15 = 10$

- 8 Emily spends 22.1% of her monthly income on rent. Her monthly income is \$1,080. Which of the following would give the best estimate of what she pays for rent?

- A. $\frac{1}{5}$ of \$1,500
- B. $\frac{1}{4}$ of \$1,500
- C. $\frac{1}{5}$ of \$1,100
- D. $\frac{3}{10}$ of \$1,100

Short-Response: Show your work for each question.

- 9 A local bank has \$300,000 at the beginning of the day. During the day, \$19,761 is withdrawn and \$31,012 is deposited. Estimate how much money the bank has at the end of the day.
- 10 John bought a 20-ounce bottle of juice. He drank $4\frac{1}{2}$ ounces and his sister drank $5\frac{1}{4}$ ounces. Estimate how much juice is left.
- 11 Explain how you can use estimation to approximate $3\frac{1}{3} \times 8\frac{7}{10}$.

- 12 A spool of chain originally contained 50 yards of chain. The hardware store sold two pieces of the chain, one 3.6 yards long and one 12.05 yards long. About how much chain is left on the spool?

Extended-Response: Show your work for each question.

- 13 The concrete plant makes storage tanks in two sizes. The large tank weighs 248.79 tons. The small tank weighs 95.52 tons. Estimate how many times heavier the large tank is than the small tank. Explain your answer.
- 14 Tyrone bought 5 shirts. The shirts were on sale for \$11.95 to \$26.95. What is the most that Tyrone could have spent on shirts? What is the least that Tyrone could have spent on shirts? What is a reasonable estimate of how much Tyrone spent on shirts? Justify your answer.

NUMBER SENSE AND OPERATIONS**Squares and Square Roots**

8.N.7 Apply the rules of powers and roots to the solution of problems. Extend the Order of Operations to include positive integer exponents and square roots.

Select the best answer for each question.

1 Evaluate $\sqrt{72.25}$.

- A. 4 C. 8.5
B. 8 D. 11.5

2 Evaluate $\sqrt{9.61}$.

- A. 3.6 C. 3.3
B. 3.5 D. 3.1

3 Evaluate $\sqrt{144}$.

- A. 12 C. 24
B. 14 D. 72

- 4 The area of a square is given by the formula $A = s^2$, where A is the area in square units and s is the side length of the square. What is the side length of a square with an area of 400 square inches?

- A. 20 inches C. 80 inches
B. 40 inches D. 200 inches

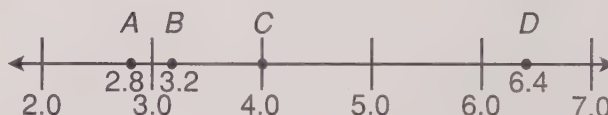
- 5 The circumference of a circle is equal to π times its diameter. If a circle has an approximate circumference of 12 inches, which is the best estimate of the length of its diameter?

- A. 3 inches
B. 4 inches
C. 5 inches
D. 6 inches

- 6 Angie's math teacher asked her to name an irrational number close to 5. Which of these numbers would be the best answer?

- A. $\sqrt{10}$
B. $\sqrt{21}$
C. $\sqrt{35}$
D. $\sqrt{55}$

- 7 Which point on the number line best represents $\sqrt{8}$?



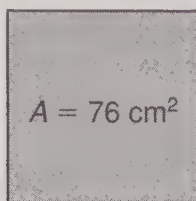
- A. Point A
B. Point B
C. Point C
D. Point D

- 8 Which of the following numbers is between Point X and Point Y on the number line?



- A. $\sqrt{27}$
B. $\sqrt{35}$
C. $\sqrt{63}$
D. $\sqrt{79}$

- 9 Which of the following is the best estimate of the length of each side of the square?



- A. 9 centimeters
 B. 10 centimeters
 C. 19 centimeters
 D. 38 centimeters
- 10 What is $\sqrt{\frac{900}{225}}$?
- A. $\frac{90}{22.5}$
 B. 4
 C. 2
 D. $1\frac{22}{25}$
- 11 Which of the following expressions does NOT represent an irrational number?
- A. $\frac{\sqrt{3}}{\sqrt{5}}$
 B. $\sqrt{6} + \sqrt{9}$
 C. $\sqrt{8} + \sqrt{1}$
 D. $\frac{\sqrt{8}}{\sqrt{2}}$

Short-Response: Show your work for each question.

- 12 Locate $\sqrt{386}$ on a number line.
- 13 Between what two consecutive integers would $\sqrt{550}$ be located on a number line?
- 14 Describe how you can find the approximate value of $\sqrt{37}$.

Extended-Response: Show your work for each question.

- 15 The area of a circle can be determined by the formula $A = \pi r^2$. Explain how you could estimate the area of a circle with a radius of 4 inches. Would your estimate be an underestimate or an overestimate? Explain.
- 16 In the figure, the shaded square is formed by connecting the midpoints of the sides of the larger square.



How does the area of the shaded square compare to the area of the larger square? Use your answer to find the side length of the larger square.

NUMBER SENSE AND OPERATIONS**Number Operations**

8.N.12 Select and use appropriate operations—addition, subtraction, multiplication, division, and positive integer exponents—to solve problems with rational numbers (including negatives).

Select the best answer for each question.

- 1** A cereal mix recipe uses $1\frac{3}{4}$ cups corn cereal and $1\frac{1}{2}$ cups rice cereal. How much cereal is needed in all?

A. $3\frac{1}{4}$ cups C. $3\frac{1}{2}$ cups
B. 3 cups D. 4 cups

- 2** Two thirds of the students at Martin Middle School chose to take an arts elective course of either art, choir, or band. Of those students, one half chose band. What fraction of all of the students at Martin Middle School chose band as an arts elective?

A. $\frac{3}{4}$ C. $\frac{3}{8}$
B. $\frac{1}{2}$ D. $\frac{1}{3}$

- 3** Joaquin's family drove from Santa Fe to Las Cruces. After $1\frac{1}{3}$ hours, they stopped in Albuquerque. The rest of the trip took $4\frac{1}{4}$ hours. How much longer was the second part of their trip than the first part?

A. $2\frac{11}{12}$ hours C. $5\frac{7}{12}$ hours
B. $3\frac{11}{12}$ hours D. 3 hours

- 4** Evaluate $\sqrt[3]{64}$.

A. 2
B. 4
C. 16
D. 32

- 5** Evaluate 5^3 .

A. $\frac{1}{15}$
B. 15
C. 25
D. 125

- 6** Evaluate the expression below when $g = 2$.

$$3g \times (5 - g)$$

A. 15
B. 18
C. 28
D. 96

- 7** Danae had an average of 75.5 after three math tests. She earned an 85 on her fourth test. What is Danae's average after four tests?

A. 27.5%
B. 40.1%
C. 56.3%
D. 77.88%

- 8 What is the value of $\frac{n^2}{5} + n^2 - 12$, when $n = 5$?
- A. -6
B. -2
C. 16
D. 18
- 9 The distance between home plate and second base, in a straight line, on a softball field is $60\sqrt{2}$ feet. Doris sprinted from home plate straight to second base and back to home plate again. How far did she sprint?
- A. 480 feet
B. $180\sqrt{6}$ feet
C. $120\sqrt{2}$ feet
D. 360 feet

Short-Response: Show your work for each question.

- 10 Simplify the following.

$$\frac{4(2x - 12)}{8}$$

- 11 At 4 P.M. the shadow of a building was 65 feet long. At 6 P.M. the shadow was 40% longer. How long was the shadow at 6 P.M.?
- 12 A moving truck is $16\frac{1}{2}$ feet long. How many $3\frac{1}{4}$ -foot-long boxes will fit lengthwise in the truck?
- 13 What is the value of the expression below?

$$4^3 - 12 \div 6 + 5$$

- 14 Hannah recently put up an outdoor thermometer that she likes to check throughout the day. Over one day, she noted the following changes in temperature.

6 A.M.	
8 A.M.	+3
10 A.M.	+2
noon	+5
2 P.M.	-2
4 P.M.	-3
6 P.M.	+1
8 P.M.	-5
10 P.M.	-4

If the temperature at 6 A.M. was 418°F , what was the temperature at noon? At 6:00 P.M.?

Extended-Response: Show your work for each question.

- 15 A jeweler has a length of gold chain and a length of silver chain to make necklaces. She has enough gold chain to make 3 necklaces that are $16\frac{1}{2}$ inches long and 2 necklaces that are $14\frac{1}{4}$ inches long. She has enough silver chain to make 6 necklaces that are $14\frac{1}{4}$ inches long. Compare the total length of gold chain to the total length of silver chain. Explain your answer.

NUMBER SENSE AND OPERATIONS**Percents**

8.N.10 Estimate and compute with fractions (including simplification of fractions), integers, decimals, and percents (including those greater than 100 and less than 1).

Select the best answer for each question.

- 1** Ralph used 75% of his study time working on his research paper. If it took him 3 hours to work on his paper, how much time did Ralph have left to work on his science homework?
- A. 1 hour C. 3 hours
B. 2 hours D. 4 hours
- 2** Miguel has a garden that has an area of 315 square feet. If the corn in his garden covers 190 square feet, what percent of the garden is corn?
- A. 50% C. 60%
B. 55% D. 65%
- 3** Alex left the waiter an 18% tip for a \$116.67 dinner. How much did Alex leave?
- A. \$19.50 C. \$20.00
B. \$19.75 D. \$21.00
- 4** Misato is saving for a new BMX bike. He deposits 35% of his allowance into his savings account each week. If the bike costs \$245.00 and Misato's allowance is \$35.00 per week, how many weeks will it take him to save enough money to buy the bike?
- A. 7 weeks C. 20 weeks
B. 14 weeks D. 24 weeks
- 5** What is the sale price of a \$575.00 stereo system that is discounted at 55% off?
- A. \$258.75
B. \$287.50
C. \$316.25
D. \$350.25
- 6** Joann increased her sales by \$15,000 from the previous year. If her sales this year were \$85,600, approximately what was her percent increase?
- A. 17% C. 21%
B. 18% D. 23%
- 7** At each basketball practice, the assistant coach records how many times each player tries a free throw and how many times the free throw is made. Which player has the highest percent of free throws made?

Players	Free Throws Made	Free Throws Tried
Kelly	38	65
Lindsay	55	70
Molly	32	40
Ramona	40	55

- A. Kelly
B. Lindsay
C. Molly
D. Ramona

- 8 Mark deposited \$560.00 in a savings account that pays 6% simple interest. What will his balance be in 5 years?

A. \$168.00 C. \$708.00
B. \$672.00 D. \$728.00

- 9 A quality-control company found that 0.064% of a certain shipment was defective. If the shipment contained 23,865 pieces, about how many pieces were defective?

A. 15 pieces
B. 151 pieces
C. 1,527 pieces
D. 15,274 pieces

- 10 Mr. and Mrs. Foster bought a large boat for \$149,800. Their state charges 7% sales tax plus an additional 10% luxury tax for the amount of the purchase over \$100,000. What is the total cost of the boat?

A. \$154,780
B. \$160,286
C. \$165,266
D. \$175,266

Short-Response: Show your work for each question.

- 11 Dynamic Cleaners pays \$250 plus 3.6% of their earnings for insurance. If Dynamic earned \$134,950, what is the cost of the insurance?
- 12 The library had 24,550 books. they held a sale of the books that were out of date or were duplicates, and now they have 20,900 books. This represents which percent of decrease, rounded to the nearest percent?

- 13 A museum has a collection of 80 antique cars. Of those cars, 12 run on steam power. What percent of the antique car collection runs on steam power?

- 14 Sandy deposited \$7500 in a savings account that pays simple interest. After 4 years, the account had earned \$1,125 in interest. What rate of interest did the account pay?

Extended-Response: Show your work for each question.

- 15 Cathy earned a bonus of 5% of her salary of \$62,400 per year. If Cathy puts half of her bonus in her 401K, she will pay 25% income tax on the other half. Otherwise, she must pay 40% income tax on her entire bonus. Compare her two options.
- 16 To promote sales, a car dealer is offering an 8% discount on any car model with a moon roof. The Petersons are considering one car without a moon roof that sells for \$24,900. They are also considering one with a moon roof that normally sells for \$27,700. The Petersons will also pay 5% sales tax on the car. Compare the costs of the two cars.

NUMBER SENSE AND OPERATIONS**Properties of Operations**

8.N.9 Use the inverse relationships of addition and subtraction, multiplication and division, and squaring and finding square roots to simplify computations and solve problems, e.g., multiplying by $\frac{1}{2}$ or 0.5 is the same as dividing by 2.

Select the best answer for each question.

- 1** Which expression is equivalent to $15 \div (6 - 1) + 10$?
- A. $15 \div (1 - 6) + 10$
B. $(6 - 1) \div 15 + 10$
C. $15 \div 6 - 1 + 10$
D. $15 \div 6 - 15 \div 1 + 10$
- 2** According to the Associative Property, the expression $(2 + 3) + 5$ is equivalent to which expression?
- A. $2 + (3 + 5)$ C. $5 + (2 + 3)$
B. $(3 + 2) + 5$ D. $2 + 3 + 5$
- 3** Which equation shows the Distributive Property?
- A. $2 \times (3 \times 4) = (2 \times 3) \times 4$
B. $2 \times 3 \times 4 = 4 \times 3 \times 2$
C. $2 \times 1 = 2$
D. $2 \times (3 + 4) = (2 \times 3) + (2 \times 4)$
- 4** According to the Distributive Property, the expression $4(9 + 6)$ is equivalent to which expression?
- A. $4(6 + 9)$
B. $(9 + 6)4$
C. $4(9) + 4(6)$
D. $4(9) + 6$
- 5** Which placement of the parentheses makes the statement true?
- A. $51 + (3 \times 82) - 191 = 52$
B. $(51 + 3) \times 82 - 191 = 52$
C. $51 + 3 \times (82 - 191) = 52$
D. $51 + (3 \times 8)2 - 191 = 52$
- 6** Which property does this equation show?
- $$146 \times 3.8 = 3.8 \times 146$$
- A. Identity Property of Multiplication
B. Distributive Property
C. Commutative Property
D. Associative Property
- 7** Which property is NOT used in the following calculation?
- $$\begin{aligned} & 3\left(4 \cdot \frac{1}{3}\right) \\ &= 3\left(\frac{1}{3} \cdot 4\right) \\ &= \left(3 \cdot \frac{1}{3}\right) \cdot 4 \\ &= 4 \end{aligned}$$
- A. Associative Property
B. Commutative Property
C. Distributive Property
D. Identity Property

- 8 The Identity Property of Multiplication is demonstrated by which equation?

A. $763 \times (4 - 3) = (763 \times 4) - (763 \times 3)$
B. $763 \times 8.6 = 8.6 \times 763$
C. $(763 \times 2) \times 4 = 763 \times (2 \times 4)$
D. $763 \times 1 = 763$

- 9 Sylvia is checking Sam's work on the following problem.

$$4(6x + 9) = 60$$

$$24x + 36 = 60$$

$$24x = 24$$

$$x = 1$$

What error did Sam make in solving the equation?

- A. He did not distribute the 4 correctly.
B. He should have added the $6x$ and $9x$ together first to get $15x$.
C. He subtracted 36 from 60 instead of adding 36 to 60.
D. Sam did not make an error.

Short-Response: Show your work for each question.

- 10 Use the Distributive Property to write an expression equivalent to $12(6 + 3)$. Simplify both expressions to show that they are equivalent.
- 11 Which property is demonstrated by this equation?

$$(3 \times 20) \times 5 = 3 \times (20 \times 5)$$

For questions 12–14, explain how you could use properties of multiplication and addition to simplify each calculation.

12 $2(17)(5)$

13 $6\left(\frac{1}{2} + \frac{1}{3}\right)$

14 $(32 + 25) + 75$

Extended-Response: Show your work for each question.

- 15 One method for multiplying a number by 5 is to take half the number, then multiply the result by 10. Use one or more properties of multiplication to explain why this method works.

NUMBER SENSE AND OPERATIONS**Ratios and Proportional Reasoning****8.N.3** Use ratios and proportions in the solution of problems, in particular, problems involving unit rates, scale factors, and rate of change.

Select the best answer for each question.

- 1** One serving of tuna fish provides 13 grams of protein, which is 0.23 of the recommended daily amount of protein. How many grams of protein are recommended for a full day? Round your answer to the nearest tenth of a gram.

A. 20 grams C. 56.5 grams
B. 36 grams D. 299 grams

- 2** The vet gave Ethan medicine for his dog. The label on the medicine bottle says, "1.5 mL per 10 lbs." Ethan's dog weighs 58 pounds. How many milliliters of medicine should Ethan give his dog?

A. 3 milliliters
B. 7.5 milliliters
C. 8.7 milliliters
D. 9.3 milliliters

- 3** Felipe made a scale model of a windmill for the Science Fair. He used the scale 1 in. = 3 ft. If the blades of the model windmill are 4.5 inches long, how long are the blades of the real windmill?

A. 1.5 feet
B. 4.5 feet
C. 7.5 feet
D. 13.5 feet

- 4** Alexis is making a fruit dessert. She bought 3 quarts of strawberries for \$7.98, 5 apples for \$1.45, and 4 bananas for \$0.99. Which is the unit cost for one quart of strawberries?

A. \$0.29 C. \$1.55
B. \$0.35 D. \$2.66

- 5** Four local gas stations are each advertising that they have the lowest gas prices in town. Eric filled his car's tank at each station. Which station actually has the lowest gas prices?

Station	Total Cost	Gallons
A1	\$24.13	10.1
Fast Gas	\$35.16	15.7
Gas Up	\$41.71	18.3
Super Gas	\$37.57	16.2

A. A1 C. Gas Up
B. Fast Gas D. Super Gas

- 6** Alicia works in a cushion factory. She packs 4 cushions in 20 minutes. If she works a 6-hour shift, how many cushions does she pack during her shift?

A. 4 cushions C. 72 cushions
B. 6 cushions D. 120 cushions

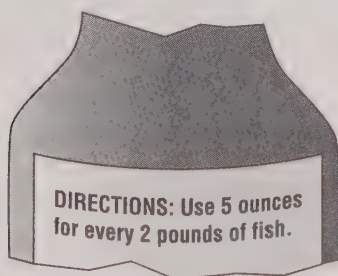
- 7** If $\frac{g}{45} = \frac{285}{75}$, what is the value of g ?

A. $g = 11.8$ C. $g = 171$
B. $g = 135$ D. $g = 208$

- 8 Tom is building a model of an old-fashioned desk. The scale of the model is 4 inches = 2.5 feet. If the height of the actual desk is 4 feet, what is the height of the model?
- A. 3.6 inches C. 9.6 inches
B. 6.4 inches D. 12.4 inches
- 9 Ellen bought 4 cases of frozen pies for \$114.88. There are 8 pies in each case. What is the unit cost of one pie?
- A. \$3.59
B. \$4.19
C. \$14.36
D. \$28.72
- 10 The length of a model barn is 8 centimeters, and the length of the actual barn is 32 meters. Which is the scale of the model barn?
- A. 1 centimeter = 4 meters
B. 1 centimeter = 8 meters
C. 2 centimeters = 4 meters
D. 2 centimeters = 6 meters

Short-Response: Show your work for each question.

- 11 The instructions on a bottle of marinade say:



How much marinade should be used for 12.4 pounds of fish?

- 12 When Michaela cleans her 30-gallon fish tank, she adds 13.2 ounces of water conditioner to keep the fish healthy. How much conditioner should she add to a 14-gallon tank?
- 13 If $\frac{92}{x} = \frac{1,196}{351}$, what is the value of x ?
- 14 A large mural along a city boulevard was painted with a scale of 1.5 feet on the wall = 1 foot in actual size. How tall would a cow that is 6.75 feet in the mural be in real life?
- 15 A map has a scale of 3 centimeters equals 50 kilometers. What actual distance would 4.5 centimeters on the map represent?

Extended-Response: Show your work for each question.

- 16 A 1 pound-12-ounce jar of peanut butter costs \$3.79. Randi needs 18 ounces of the peanut butter to make cookies. Does Randi have enough peanut butter? What was the cost of the peanut butter Randi used, rounded to the nearest whole cent? Explain your answer.
- 17 The makers of PowerUp protein bars use 75 almonds to make 16 4-ounce bars. The makers of GoGoGo protein bars use 300 almonds to make 64 3-ounce bars. Which protein bar has more almonds per ounce? Suppose the makers of GoGoGo bars increase the size of the bar to 4 ounces without using any more almonds per bar. Compare the almonds per ounce of the larger bar with the PowerUp bars.

NUMBER SENSE AND OPERATIONS**Scientific Notation**

8.N.4 Represent numbers in scientific notation, and use them in calculations and problem situations.

Select the best answer for each question.

- 1 According to the U.S. Census Bureau, the world population in 2005 was approximately six billion, four hundred eighty-two million people. Which shows that number written in scientific notation?
- A. 6.482×10^7
B. 6.482×10^8
C. 6.482×10^9
D. 6.482×10^{10}
- 2 Large quantities of cloth are measured in bolts. A fabric store received 8 bolts of cloth in one shipment. This amount of cloth is equivalent to 8.0×10^2 yards of cloth. Which represents this number in standard form?
- A. 0.008 yards
B. 0.08 yards
C. 800 yards
D. 8,000 yards
- 3 Two units used to measure land are square meters and square kilometers. One square meter equals 0.000001 square kilometer. Which expression represents this number in scientific notation?
- A. 1.0×10^{-6}
B. 1.0×10^{-5}
C. 1.0×10^5
D. 1.0×10^6

- 4 The chart shows the average distance of some planets from the Sun.

Planet	Distance in Miles
Mercury	36,000,000
Mars	141,000,000
Jupiter	480,000,000

Which expression represents the distance from Jupiter to the Sun in scientific notation?

- A. 0.48×10^9 C. 4.8×10^8
B. 4.8×10^7 D. 48.0×10^7

- 5 The chart shows the approximate population of some countries in 2000.

Country	Population
China	1.269×10^9
India	1.003×10^9
United States	2.823×10^8

Which represents the population of China in standard form?

- A. 126,900,000
B. 1,000,000,269
C. 1,269,000,000
D. 1,269,000,000,000

- 6 The wavelength of red light is 6.8×10^{-4} millimeters. Which represents this number in standard form?

A. 0.000068 C. 6.80000
B. 0.00068 D. 68,000

- 7 The smallest unit of weight in the customary system of measurement is the grain. There are 7.0×10^3 grains in one pound. Which represents that number in standard form?

A. 0.0007 C. 7,000
B. 0.007 D. 70,000

- 8 The chart shows the diameters of some planets.

Planet	Diameter in Miles
Saturn	75,000
Jupiter	89,000
Mars	4,200

Which expression represents the diameter of Jupiter in scientific notation?

A. 0.89×10^5 C. 8.9×10^4
B. 8.9×10^3 D. 89×10^3

- 9 Two units that can be used to measure the volume of a cube are cubic millimeters and cubic meters. One cubic millimeter equals 0.000000001 cubic meter. Which expression represents this number in scientific notation?

A. 1.0×10^{-9} C. 1.0×10^8
B. 1.0×10^{-8} D. 1.0×10^9

Short-Response: Show your work for each question.

- 10 The chart shows the predicted population of the world in future years.

Year	Predicted Population
2010	6.826×10^9
2020	7.563×10^9
2030	8.206×10^9

What is the predicted world population in 2030 in standard form?

- 11 The diameter of a human red blood cell is 7.65×10^{-3} millimeters. Write that number in standard form.
- 12 The Olympic Stadium in Sydney, Australia, can seat 110,000 people. Write that number in scientific notation.
- 13 Use scientific notation to approximate the value of the expression.
 $911 \times 28,899$

Extended-Response: Show your work for each question.

- 14 There are nearly 6×10^{12} miles in a light-year (the distance light travels in a year). Explain how you can find the number of miles in 4 light-years. Then find the answer and write it in scientific notation.
- 15 Explain the difference between the values of 34 and 3×10^4 .
- 16 Without multiplying, explain how you can know which number is larger.

2.4×10^5 or 3,100

Then, write both numbers in scientific notation to show which is larger.

PATTERNS, RELATIONS, AND ALGEBRA**Algebraic Expressions**

8.P.2 Evaluate simple algebraic expressions for given variable values, e.g., $3a^2 - b$ for $a = 3$ and $b = 7$.

Select the best answer for each question.

- 1 The Perkins family drove at an average speed of 57 miles per hour for h hours. Along the way, they paid tolls of $\$t$. Which expression can be used to find the distance the Perkins family drove?
- A. $57 \cdot t \cdot h$ C. $57 \div h$
B. $57 \cdot h$ D. $57 \cdot t$
- 2 The distances between some planets and the Sun are less than the distance between Earth and the Sun by the factors shown in the table.

Planet	Factor
Mercury	0.38710
Venus	0.72333
Earth	1.0

Which expression describes v , the distance between Venus and the Sun, in terms of e , the distance between Earth and the Sun?

- A. $0.72333 \cdot e$
B. $e - 0.72333$
C. $0.38710 \cdot e$
D. $\frac{e}{0.72333}$

- 3 On average, the number of fish tacos f sold by a taco store in one mall is greater than the number of chicken tacos c sold by a factor of 2.3. Which expression could be used to find f if c is known?
- A. $c + 2.3$
B. $2.3 \div c$
C. $2.3c$
D. $c \div 2.3$
- 4 The rate of gratuity (tip) charged by one restaurant for serving large groups of people is 0.18. Which expression can be used to find the gratuity if m equals the cost of the meal without the gratuity?
- A. $0.18g$
B. $m + 0.18$
C. $0.18m$
D. $0.18 \div m$
- 5 A swimming pool charges a \$75 membership fee per year, and \$1.50 each time you bring a guest. Which expression shows the yearly cost in terms of the number of guests g ?
- A. $75g + 1.5$
B. $-1.5g + 75$
C. $1.5g + 75$
D. $1.5g + 75g$

- 6 The Fowler family plans to spend 4 days in a hotel at the beach.

SHORE SIDE INN

Rooms from

\$59.50

Weekly Vacation Special

\$349.50

Which expression can they use to find the cost of a room for d days at the lowest rate?

- A. $d \times 59.50$
- B. $d \times 290$
- C. $349.50 \div d$
- D. $d(349.50 \div 59.50)$

Short-Response: Show your work for each question.

- 7 The sales tax rate in one state is 5%. Write an expression that can be used to find the sales tax on an item if i equals the cost of the item without tax.

- 8 The Smith family plans to rent a car for d days.

Write an expression that represents the cost of renting a car for d days at the lowest rate offered.

Save More Car Rentals

Daily Rates Starting at

\$15.95

- 9 To plant n acres of a normal crop of corn, it takes $5n - 2$ bags of seed. If a farmer wants to plant a crop with twice as many stalks per acre, write an expression that represents the number of bags of seed he will need for n acres.

Extended-Response: Show your work for each question.

- 10 Write an expression for a rule for the data in the table below.

h	Data
10	7
14	9
18	11

- 11 Fiona's age is five years more than one-half of Danielle's age. If d represents Danielle's age write an expression that represents Fiona's age. Suppose Gina's age is 3 years less than twice Fiona's age. Explain how you would write an expression that represents Gina's age in terms of d .
- 12 Carla is collecting rainwater in a cistern. Currently she has 18 inches of water in the cistern. The rain is falling at a rate of 1.5 inches an hour. Write an expression to find the amount of rainwater collected after h hours. If the rate at which the rain falls doubles, explain how the expression would change.

PATTERNS, RELATIONS, AND ALGEBRA**Linear Functions**

8.P.4 Create and use symbolic expressions and relate them to verbal, tabular, and graphical representations.

Select the best answer for each question.

- 1 Which of the following is NOT a function?

A.	Input	8	6	5	4
	Output	7	5	4	3

B.	Input	0	3	6	9
	Output	5	15	20	25

C.	Input	2	0	-2	-4
	Output	0	-2	-4	-6

D.	Input	1	0	1	2
	Output	-1	0	1	4

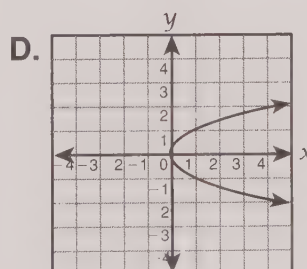
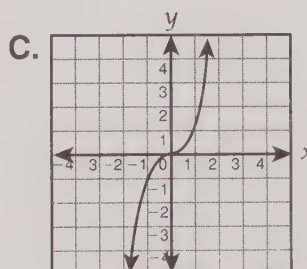
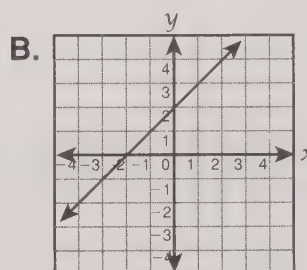
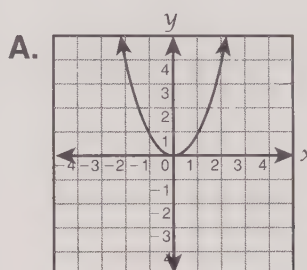
- 2 Which of the following is an example of a linear function?

- A. $f(x) = 3x + 9$
B. $f(x) = 2^x$
C. $f(x) = 4x^2 - 7$
D. $f(x) = x^3$

- 3 Describe the graph of $y = -4x$.

- A. decreasing, linear
B. increasing, linear
C. decreasing, nonlinear
D. increasing, nonlinear

- 4 Which of the following graphs is linear?



- 5 What missing value in the table below could make the function linear?

x	3	4	5	6
y	17	—	11	8

- A. 10
 B. 12
 C. 14
 D. 15
- 6 Which of the following functions is constant?
- A. $y = x$
 B. $y = 4$
 C. $y = x^3$
 D. $y = x^2$

- 7 Which of the following is a function?

- A.

Input	-7	-3	2	8
Output	7	3	-2	-8
- B.

Input	3	3	3	3
Output	0	1	2	3
- C.

Input	7	12	8	8
Output	-1	0	-1	1
- D.

Input	1	2	3	2
Output	0	1	0	-1

- 8 Which of the tables of values can be found using the function below?

$$f(x) = \frac{3x - 5}{2}$$

- A.

x	f(x)
0	$-\frac{5}{2}$
2	$-\frac{1}{2}$
3	2
- C.

x	f(x)
0	$-\frac{5}{2}$
1	-1
3	2
- B.

x	f(x)
1	-4
2	$\frac{1}{2}$
3	2
- D.

x	f(x)
1	-1
2	$-\frac{1}{2}$
3	2

Short-Response: Show your work for each question.

- 9 Is the function in the table linear or nonlinear? Explain how you determined your answer.

x	2	4	6
y	5	7	11

- 10 Describe the graph of $y = x$.

Extended-Response: Show your work for each question.

- 11 A linear function passes through the points (2, 1) and (5, 7). Graph the function and explain how you would determine the function rule.

PATTERNS, RELATIONS, AND ALGEBRA**Patterns and Sequences**

8.P.1 Extend, represent, analyze, and generalize a variety of patterns with tables, graphs, words, and, when possible, symbolic expressions. Include arithmetic and geometric progressions, e.g., compounding.

Select the best answer for each question.

- 1** Charlie has a bank account into which he makes weekly deposits. Each deposit is greater than the previous one. Each week he deposits more than he did the week before. His balances are listed below. If Charlie continues this pattern, at what week will his balance exceed \$100.00?

Week	1	2	3	4
Balance	\$11.00	\$24.00	\$39.00	\$56.00

- A. Week 6
B. Week 7
C. Week 8
D. Week 9
- 2** Which of the following is an arithmetic sequence?
- A. 1, 4, 9, 16, ...
B. 3, 6, 12, 24, ...
C. 7, 3, -1, -5, ...
D. 2, 5, 4, 8, 7, ...
- 3** Find the 8th term in the geometric sequence: $\frac{1}{3}$, 1, 3, 9, ...
- A. 91.125 C. 729
B. 216 D. 5,832

- 4** What is the missing term in the input/output table?

x	$y = 11x - 15$
-2	-37
0	-15
3	?
4	29

- A. -4 C. 18
B. 7 D. 22
- 5** Which of the following is NOT an arithmetic sequence?
- A. 11, 24, 37, 50, ...
B. 4, 8, 16, 32, ...
C. 0, 100, 200, 300, ...
D. 4, 2, 0, -2, -4, ...
- 6** What is the missing term in the input/output table?

x	$y = -7x - 30$
-3	9
0	-30
4	?
5	-65

- A. -85 C. -38
B. -58 D. -2

- 7 What is the 99th figure in this pattern? Assume these 5 figures keep repeating.

θ \triangle Ξ E π
 1st 2nd 3rd 4th 5th

- A. θ C. E
 B. \triangle D. π

- 8 What is the common ratio in the following geometric sequence?

$\frac{1}{2}, \frac{1}{4}, \frac{1}{8}, \frac{1}{16}, \dots$

- A. $\frac{1}{4}$ C. 1
 B. $\frac{1}{2}$ D. 2

Short-Response: Show your work for each question.

- 9 Find the 9th term in the geometric sequence: $\frac{1}{4}, \frac{1}{2}, 1, 2, 4, 8, \dots$
- 10 Write a pattern of four numbers that obeys the following rule. Start with a number less than 25. The numbers are decreasing by 4.5.
- 11 Part of a number sequence is given below.
- 2, 3, 5, 8, 13, 21, ...
- What is the next number?
What is the rule?
- 12 Write a pattern of four numbers that obeys the following rule. Start with 1.
- Each number is one more than two times the previous number.

- 13 Use the following pattern to find the units digit of 7^{12} . What is the pattern?

$$7^1 = \underline{7}$$

$$7^2 = \underline{49}$$

$$7^3 = \underline{343}$$

$$7^4 = \underline{2,401}$$

$$7^5 = \underline{16,807}$$

$$7^6 = \underline{117,649}$$

Extended-Response: Show your work for each question.

- 14 Tom buys lunch every work day at one of two restaurants, Burrito Palace or The Soup Shop. He always gets the lunch special, which costs \$4.25 at Burrito Palace, and \$3.50 at The Soup Shop. If he alternates each day between the two restaurants, what are the first 5 terms of the sequence that represents his total amount spent on lunch? Explain how you would find the 10th term in the sequence.
- 15 Suppose a certain tree had the property that if you cut off one of its branches, two more would grow back in the same place. If the tree starts with 24 branches and you cut off 6, how many branches would the tree have after the new branches have grown in? Explain how the pattern would change if 3 branches grew back for each one cut off.

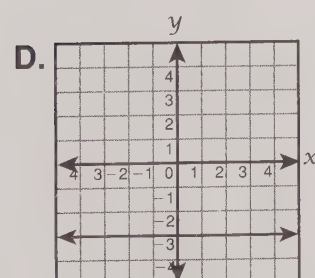
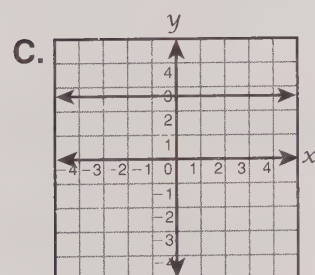
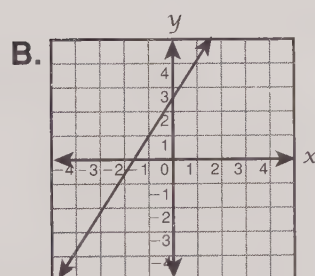
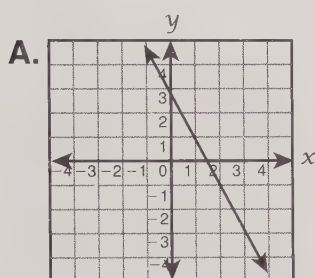
PATTERNS, RELATIONS, AND ALGEBRA

Rates of Change

8.P.8 Explain and analyze both quantitatively and qualitatively, using pictures, graphs, charts, or equations how a change in one variable results in a change in another variable in functional relationships, e.g., $C = \pi d$, $A = \pi r^2$ (A as a function of r), A rectangle – ℓw (A rectangle as a function of ℓ and w).

Select the best answer for each question.

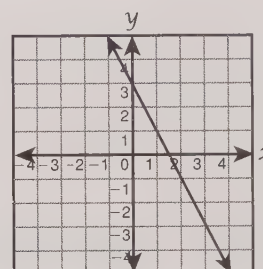
- 1 Which graph corresponds to the equation $y = -2x + 3$?



- 2 In the linear equation, $y = 2x - 3$, the value 2 represents which of the following?

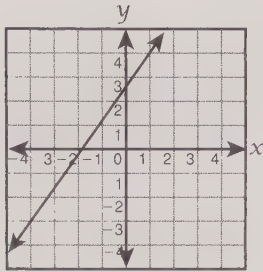
- A. the slope of the line
- B. the y -coordinate of the y -intercept
- C. the x -coordinate of the y -intercept
- D. the quadrant in which the line lies

- 3 At what point does the line in the graph below cross the y -axis?

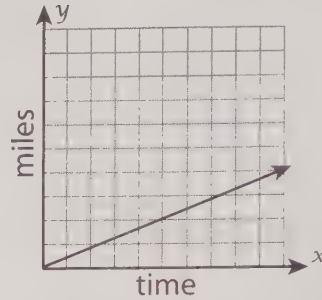


- A. $(0, \frac{3}{2})$
- B. $(3, 0)$
- C. $(0, 3)$
- D. $(\frac{3}{2}, 0)$

Use the graph below to answer questions 4 and 5.



Use the graph for questions 7 and 8. The graph represents distance traveled over time.



- 4 How would you describe the slope of the line?
- The slope is positive.
 - The slope is negative.
 - The slope is 0.
 - The slope is undefined.
- 5 At what point does the line cross the y -axis?
- $(\frac{5}{2}, 0)$
 - $(0, -2)$
 - $(0, \frac{5}{2})$
 - $(-2, 0)$

Short-Response: Show your work for each question.

- 6 In 2000, a movie ticket cost \$4.00. In 2005, a movie ticket costs \$9.25. What is the average rate of change of the price of a movie ticket in dollars per year?

- 7 What does the slope of the line represent?
- 8 How would the slope of the line change if the number of miles traveled over the same period of time doubled? Graph the line.
- 9 Roberto's father rented a car at a rate of \$75 per day and \$0.15 per mile. Write an equation to represent this situation.
- 10 Explain why the slope of a horizontal line is 0.
- 11 Explain how you can determine the slope of line that is written in slope-intercept form, $y = mx + b$.

Extended-Response: Show your work for each question.

- 12 Su Lin's phone costs \$20 per month plus \$0.10 per minute. Write an equation that represents her monthly cost y if she uses the phone for x minutes. Graph the equation and explain what the slope represents.

PATTERNS, RELATIONS, AND ALGEBRA**Functions**

8.P.9 Use linear equations to model and analyze problems involving proportional relationships. Use technology as appropriate.

Select the best answer for each question.

- 1 Which equation models the function in the table if c represents the cost and n represents the number of pizzas?

n	1	2	3	4
c	7	12	17	22

- A. $c = 7n$
B. $c = 6n + 1$
C. $c = 10n - 3$
D. $c = 5n + 2$

- 2 What are the missing values in the table, given that $y = 2x - 5$?

x	y
1	-3
2	-1
3	?
4	?

- A. 3, 1
B. -1, -3
C. -3, -1
D. 1, 3

- 3 Look at the input-output table. What is the rule for this function?

Input	Output
3	12
1	6
-2	-3

- A. $f(x) = 3x + 3$
B. $f(x) = x^2 + 3$
C. $f(x) = 2x + 1$
D. $f(x) = x^2 + 5$

- 4 The table represents a bus schedule where buses run every 12 minutes during the morning commute. What are the next two entries in the table?

Bus Number	Time
1	6:17 A.M.
2	6:29 A.M.
3	?
4	?

- A. 6:31 A.M.; 6:43 A.M.
B. 6:41 A.M.; 6:53 A.M.
C. 6:51 A.M.; 7:03 A.M.
D. 6:50 A.M.; 7:11 A.M.

- 5 A video rental store charges a \$10 yearly membership fee and \$3 per video. Which equation can be used to determine the yearly cost, c , of renting n videos in one year?

A. $c = 10n + 3$ C. $c = 10 + 3n$
 B. $c = 13n$ D. $c = 3n$

- 6 Complete the table for $f(x) = x^2 + 3x - 2$.

x	y
0	
2	
4	

A. 0, 4, 5 C. -2, 8, 24
 B. -2, 4, 24 D. -2, 8, 26

Short-Response: Show your work for each question.

- 7 Write a rule for this pattern.

112	60	34	21	14.5
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- 8 What is the value of the eighth term of the sequence $4^5, 4^4, 4^3, \dots$?

Explain your answer.

- 9 A rubber ball is dropped from a height of 180 feet. The ball bounces $\frac{4}{5}$ of its previous height. How far does the ball bounce on its 6th bounce? Explain your answer.

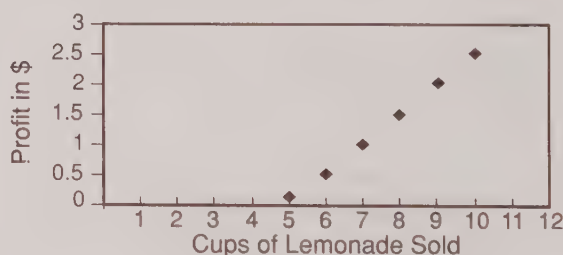
Extended-Response: Show your work for each question.

- 10 Nicholas' grandfather gave him \$3 on his 10th birthday, \$6 on his 11th birthday, and \$12 on his 12th birthday. Nicholas thinks that his grandfather will give him \$21 on his 13th birthday. Nicholas' sister says their grandfather should give him \$24 on his 13th birthday. Who is correct? Explain.

- 11 Maria's car averages 25 miles per gallon on the highway. Maria fills up the tank, which holds 16 gallons, and starts on a trip. Complete the table below. Explain what type of function is represented by the table, and what the domain and range represent.

Miles traveled	50	125	250	350
Gallons remaining				

- 12 Lamar sells lemonade and his profit is shown on the graph below. He used some of his own money to buy cups and lemonade mix. Write a rule for the function that represents his profit (p) after selling n cups of lemonade. Explain what the x -intercept of the graph represents.



PATTERNS, RELATIONS, AND ALGEBRA**Systems of Equations**

8.P.6 Identify the roles of variables within an equation, e.g., $y = mx + b$, expressing y as a function of x with parameters m and b .

Select the best answer for each question.

- 1 Hector's total score on the SAT was 1221. His math score, m , was 300 points less than twice his verbal score, v . Which system of equations can be used to determine his scores?
- A. $m + v = 1221$
 $m = 2v - 300$
- B. $m + v = 1221$
 $m = 300 - 2v$
- C. $m + v = 1221$
 $300 = 2v$
- D. $m - v = 1221$
 $m = 2v - 300$
- 2 A farmer raises apples and cherries on 215 acres of land. He plans to add acreage to his farm. He wants to have 31 more acres of apple trees than cherry trees. Which system of equations can be used to determine how many acres of each he should plant?
- A. $a + c = 215$
 $a + c = 31$
- B. $a - c = 215$
 $a + c = 31$
- C. $a + c = 215$
 $a + 2c = 31$
- D. $a + c = 215$
 $a - c = 31$
- 3 The perimeter of a rectangle is 54 in. The length is 3 in. more than the width. What is the length of the rectangle?
- A. 13 in.
- B. 15 in.
- C. 25.5 in.
- D. 28.5 in.
- 4 Megan has \$6000 to invest. She will invest part of her money in a stock account that yields 8% interest. She will put the rest in a savings account that yields 3% interest annually. After the first year, Megan earned \$350 in interest. Which system of equations can be used to determine how much money she placed in each account?
- A. $x + y = 6000$
 $0.3x + 0.8y = 350$
- B. $x + y = 6000$
 $3x + 8y = 350$
- C. $x + y = 6000$
 $0.03x + 0.08y = 350$
- D. $x + y = 6000$
 $0.03x + 0.08y = 350$

- 5 The price of admission to Splash water park for 6 adults and 5 children is \$205.45. Admission for 2 adults and 3 children is \$89.75. Which system of equations can be used to determine the admission price for one adult?

A. $6x + 5y = 205.45$
 $2x + 3y = 89.75$

B. $6x + 2y = 205.45$
 $5x + 3y = 89.75$

C. $6x - 2y = 115.70$
 $5x + 3y = 89.75$

D. $6x - 5y = 205.45$
 $2x - 3y = 89.75$

- 6 5 times a number plus 3 times a second number is 58. The second number is 2 less than the first. Which system of equations can be used to find the two numbers?

A. $5n + 3m = 58$
 $n + m = 2$

B. $3n + 5m = 58$
 $n - m = 2$

C. $5n + 3m = 58$
 $n - m = 2$

D. $3n + 5m = 2$
 $n + m = 58$

- 7 Mr. Smith's math test had 35 questions. Each multiple choice question was worth 2 points, and each short-response question was worth 5 points, for a total of 100 points. How many multiple-choice questions are on the test?

A. 10

B. 25

C. 35

D. 50

Short-Response: Show your work for each question.

- 8 Roscoe makes a \$9.25 purchase at the grocery store with a \$20 bill. The store has no bills and gives him all his change in quarters and fifty-cent pieces. There are 30 coins in all. How many fifty-cent pieces were there?
- 9 Three integers have a sum of 35. The second integer is 6 more than the first integer. The third integer is three less than twice the second integer. What are the three integers?
- 10 Angela has 12 fewer movies than Craig. The number of movies that they have combined is 56. Write a system of equations that can be used to determine how many movies Craig and Angela have.

Extended-Response: Show your work for each question.

- 11 Darren plans to plant 52 bulbs. He has one bag of 12 daffodil bulbs. He plans to buy hyacinth bulbs in bags that contain 4 bulbs each. Write and solve a system of equations to find how many bags of hyacinth bulbs he should buy. Darren decides to double the number of daffodil bulbs he will plant. He increases the total number of bulbs to 64. Write and solve a system of equations to find how many bags of hyacinth bulbs he should buy.

PATTERNS, RELATIONS, AND ALGEBRA**Solve Equations and Inequalities**

8.P.7 Set up and solve linear equations and inequalities with one or two variables, using algebraic methods, models, and/or graphs.

Select the best answer for each question.

- 1 What is the solution to the inequality below?

$$13 - 6x < 4x - 77$$

- A. $x > -9$ C. $x < -9$
B. $x > 9$ D. $x < 9$

- 2 Listed below are Shelly's scores in English class. What score does she need to earn on her last essay in order to have an average of 95% for the term?

Shelly's English Scores

Test 1	99%
Essay 1	94%
Test 2	96%
Essay2	98%
Test 3	93%
Essay3	?

- A. 86% C. 93%
B. 90% D. 94%

- 3 Which inequality does NOT have the value of -9 as part of the solution set?

- A. $5y - 4 > 32 + 7y$
B. $\left(\frac{2}{3}\right)y > -21$
C. $7 - 2y > 10$
D. $38 + \left(\frac{1}{3}\right)y > 2 - y$

- 4 Which equation has a solution of -18 ?

- A. $3x - 9 = 45$
B. $-4 + \left(\frac{1}{3}\right)x = -10$
C. $\left(\frac{1}{6}\right)x + 3 = \left(\frac{1}{6}\right)(x + 3)$
D. $-x + 2 = -16$

- 5 Which value of y makes the equation below true?

$$105 = \frac{y}{6}$$

- A. $y = 17.5$
B. $y = 600$
C. $y = 630$
D. $y = 660$

- 6 Mitchell is paid twice the normal hourly wage for each hour he works over 40 hours in a week. Last week he worked 50 hours and earned \$754.20. What is Mitchell's hourly wage?

- A. \$11.72
B. \$12.57
C. \$13.55
D. \$18.86

- 7 At the circus, an adult ticket costs 3 times more than a child's ticket. 2 adults and 3 children tickets cost \$45.00. What is the cost of an adult ticket to the circus?

A. \$5.00
B. \$10.00
C. \$15.00
D. \$20.00

- 8 What is the solution to the inequality below?

$$-5(6y + 22) < -12y + 40$$

A. $y < 8\frac{1}{3}$
B. $y < 1\frac{2}{3}$
C. $y > -8\frac{1}{3}$
D. $y > -1\frac{2}{3}$

- 9 Which is NOT a solution to the following inequality?

$$5(x - 4) \leq 40$$

A. 12
B. 10
C. 15
D. -9

- 10 What is the solution to the equation below?

$$3x - 18 = -24 + x + 12$$

A. 15
B. 7.5
C. -6
D. -18

Short-Response: Show your work for each question.

- 11 Solve $\frac{3}{8}x - 5 = 19$. Show your work.

- 12 Solve the inequality $-2x < 22$ and graph the solution on a number line.

Extended-Response: Show your work for each question.

- 13 The chorus is going on a trip to participate in a competition. The director estimates that the total expenses for the trip will be \$578.00. They currently have \$242.00. To raise the rest of the money, the members of the chorus are holding a car wash. Compare the minimum number of cars they would need to wash if they charged \$4.50 per car to the minimum number they would need to wash if they charged \$6.00 per car.

- 14 Ava's hourly wage is \$9, and she earns at least \$2 more per hour than Kevin. Write and solve an inequality to represent the possible values of Kevin's hourly wage. Graph the solution on a number line. Suppose Kevin got a raise of \$0.50 per hour. Explain the difference in the graph of the solution of the inequality.

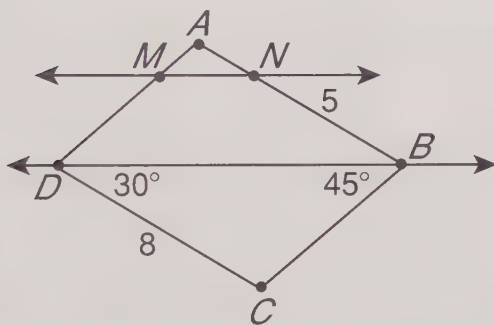
GEOMETRY

Congruent Polygons

8.G.2 Classify figures in terms of congruence and similarity, and apply these relationships to the solution of problems.

Select the best answer for each question.

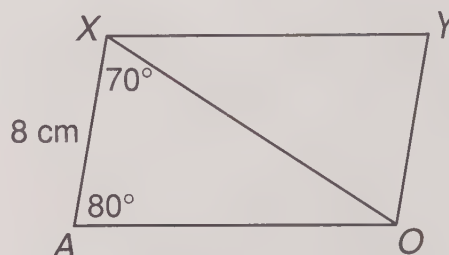
Use this figure below for questions 1–3. $ABCD$ is a parallelogram. Lines MN and DB are parallel. $\triangle ABD$ is congruent to $\triangle CDB$.



- 1 Which side is congruent to \overline{BC} ?
 - A. \overline{AB}
 - B. \overline{CD}
 - C. \overline{DA}
 - D. \overline{DB}
- 2 Which angle is congruent to $\angle ADB$?

A. $\angle ABD$	C. $\angle CBD$
B. $\angle BCD$	D. $\angle CDB$
- 3 What is $m\angle DAB$?
 - A. 30°
 - B. 45°
 - C. 105°
 - D. 75°




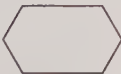
Use the figure below for questions 4–6. $\triangle XAO$ is congruent to $\triangle OYX$.



- 4 What is $m\angle XOA$?
 - A. 10°
 - B. 30°
 - C. 70°
 - D. 80°
- 5 What is the length of \overline{YO} ?
 - A. 2 centimeters
 - B. 4 centimeters
 - C. 12 centimeters
 - D. 8 centimeters
- 6 What is $m\angle YXO$?
 - A. 10°
 - B. 30°
 - C. 80°
 - D. 150°

- 7 Which polygon is congruent to this hexagon?



- A. 
- B. 
- C. 
- D. 

- 8 $\triangle XYZ \cong \triangle PQR$. Which of the following statements is NOT true?

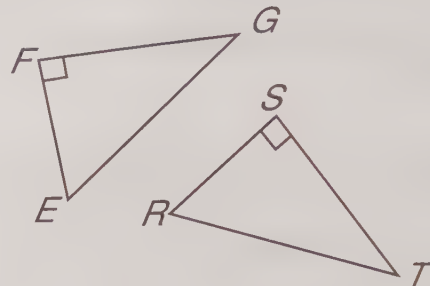
- A. $m\angle Y = m\angle Q$
- B. $XZ = PR$
- C. $\angle ZXY \cong \angle QRP$
- D. $\overline{YX} \cong \overline{QP}$

- 9 In which figure do you always get two congruent isosceles triangles when you draw a diagonal?

- A. right triangle
- B. trapezoid
- C. rhombus
- D. parallelogram

Short-Response: Show your work for each question.

Use the figures below for questions 10–12. $\triangle FGE \cong \triangle STR$.



- 10 If $m\angle G = 30^\circ$, what is $m\angle R$?
- 11 If $FG = 10$ centimeters and $SR = 8$ centimeters, find TR . Round your answer to the nearest tenth.
- 12 If FE is 7 centimeters, what is the length of side \overline{SR} ?

Extended-Response: Show your work for each question.

- 13 Matt drew the diagonal \overline{AC} of quadrilateral $ABCD$ and got two congruent right triangles. If $\triangle ABC \cong \triangle ADC$, what kind of quadrilateral is $ABCD$? If $\triangle ABC \cong \triangle CDA$, what kind of quadrilateral is $ABCD$? Explain. Include diagrams with your explanation.

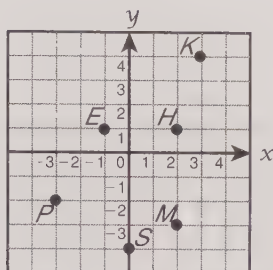
GEOMETRY

Coordinate Geometry

8.G.8 Recognize and draw two-dimensional representations of three-dimensional objects, e.g., nets, projections, and perspective drawings.

Select the best answer for each question.

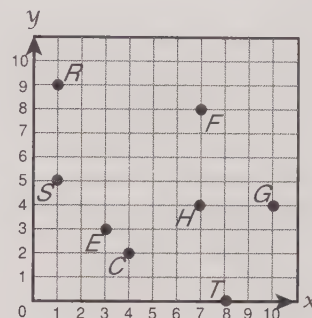
Use the figure below to answer questions 1–3.



- 1 Points E , H , and P are three vertices of a parallelogram. What is the fourth vertex?
 - A. $(0, -2)$
 - B. $(1, -2)$
 - C. $(-1, -2)$
 - D. $(2, 0)$
- 2 What is the distance from point E to point P ?
 - A. 2.1
 - B. 3.0
 - C. 3.6
 - D. 5.0
- 3 The distance from point K to point L is 5. Which of these could be the coordinates for point L ?

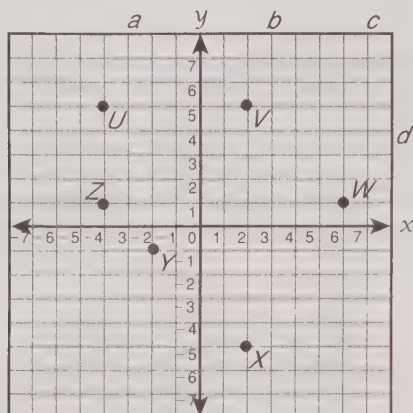
A. $(3, 0)$	C. $(0, 0)$
B. $(3, 1)$	D. $(-1, -2)$

Use the figure below to answer questions 4–6.



- 4 Which points are the vertices of a right triangle?
 - A. R , H , and F
 - B. F , H , and G
 - C. H , E , and T
 - D. None of these
- 5 What is the distance from point S to point T ? Round to the nearest tenth.
 - A. 8.6
 - B. 7.2
 - C. 6.8
 - D. 5.6
- 6 What are the side lengths of $\triangle FGH$?
 - A. 4, 3, 3
 - B. 3, 4, 6
 - C. 3, 4, 5
 - D. 3, 4, 4

Use this figure for questions 7–9.



- 7 What is the midpoint of \overline{UV} ?
- (1, 5)
 - (-1, 5)
 - (-1, -5)
 - (1, -5)
- 8 What is the distance between point X and point W ? Round to the nearest tenth.
- 4.1
 - 6.3
 - 6.5
 - 7.2
- 9 Which three points are the vertices of an isosceles triangle?
- Points U, V, Y
 - Points V, Y, Z
 - Points V, W, X
 - Points X, W, Z

Short-Response: Show your work for each question.

- 10 Use the Distance Formula to find the distance between (1, 3) and (4, 7).
- 11 Use the Distance Formula to find the distance between $(-7, 4)$ and $(-1, -4)$.
- 12 Write the coordinates of two points that are 12 units apart.
- 13 Find the midpoint of the line segment with endpoints (1, 3) and (7, 5).

Extended-Response: Show your work for each question.

- 14 AB has endpoints $A(3, 2)$ and $B(-5, 8)$. Use the Midpoint Formula to find the midpoint M of AB , then use the Distance Formula to verify that $AM = MB$.
- 15 Draw quadrilateral $MNPQ$ with vertices at $M(3, 4)$, $N(4, 1)$, $P(3, 22)$, and $Q(2, 1)$. Classify the quadrilateral. Explain your reasoning.

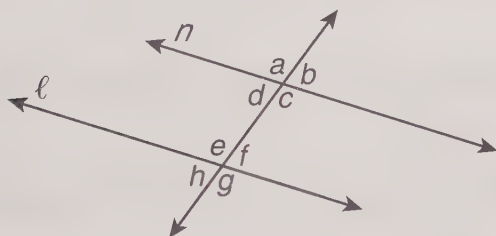
GEOMETRY

Parallel Lines

8.G.3 Demonstrate an understanding of the relationships of angles formed by intersecting lines, including parallel lines cut by a transversal.

Select the best answer for each question.

Use the figure below for questions 1–4.
Lines ℓ and n are parallel.



1 Which list indicates exterior angles only?

- A. $\angle a$, $\angle b$, $\angle c$, and $\angle d$
- B. $\angle a$, $\angle b$, $\angle g$, and $\angle h$
- C. $\angle a$, $\angle d$, $\angle e$, and $\angle h$
- D. $\angle a$, $\angle d$, $\angle e$, and $\angle f$

2 Which two angles are congruent vertical angles?

- A. $\angle c$ and $\angle a$
- B. $\angle c$ and $\angle b$
- C. $\angle c$ and $\angle e$
- D. $\angle c$ and $\angle h$

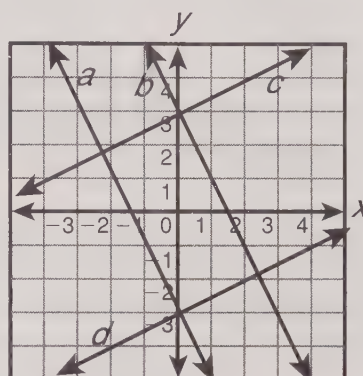
3 Which two angles are NOT congruent?

- A. $\angle h$ and $\angle f$
- B. $\angle h$ and $\angle b$
- C. $\angle h$ and $\angle c$
- D. $\angle h$ and $\angle d$

4 If $\angle e$ measures 110° , what is the measure of $\angle b$?

- A. 20°
- B. 70°
- C. 110°
- D. 170°

Use the figure below for questions 5–6.



5 What do lines a and b have in common?

- A. x-intercept
- B. y-intercept
- C. slope
- D. constant term

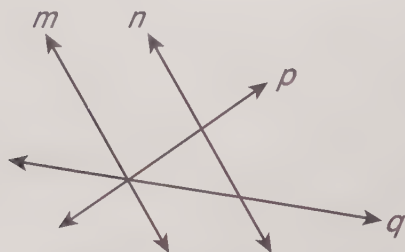
6 How are the slopes of lines a and c related?

- A. The slopes are opposites.
- B. The slopes are reciprocals.
- C. The slopes are equal.
- D. The slopes are negative reciprocals.

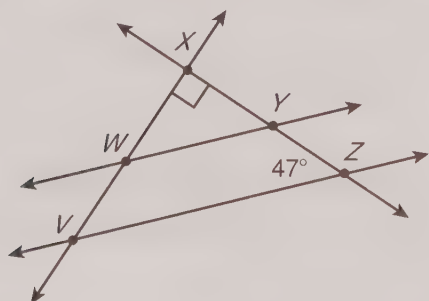
7 Which type of angle pair is NOT necessarily formed by two intersecting lines?

- A. vertical
- B. congruent
- C. complementary
- D. supplementary

Use the figure below for questions 8–9. Lines m and n are parallel.



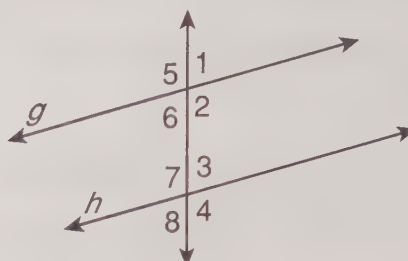
- 8 Which lines do NOT form a pair of vertical angles?
- lines m and n
 - lines m and p
 - lines m and q
 - lines p and q
- 9 Which of these statements is true?
- Only line p is a transversal for lines m and n .
 - Only line q is a transversal for lines n and m .
 - Both lines p and q are transversals for lines n and m .
 - Lines n , p , and q are all transversals for line m .
- 10 Lines WY and VZ are parallel. What is the measure of $\angle XWY$?



- 43°
- 133°
- 47°
- 137°

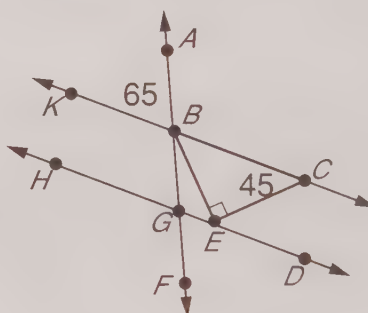
Short-Response: Show your work for each question.

Use the figure below for questions 11–13. Lines g and h are parallel.



- Name a pair of supplementary angles.
- Name a pair of corresponding angles.
- Name a pair of alternate interior angles.

Extended-Response: Show your work for each question.



- 14 Lines KC and HD are parallel. Name the eight angles formed by transversal AF and give their measures. Name all angles in the figure that measure 45° . Explain your answer.

GEOMETRY**Pythagorean Theorem**

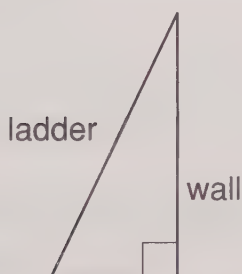
8.G.4 Demonstrate an understanding of the Pythagorean theorem. Apply the theorem to the solution of problems.

Select the best answer for each question.

- 1 A Pythagorean triple is a set of three numbers that will make the sides of a right triangle. Which set of numbers is a Pythagorean triple?

A. 12, 5, 13
B. 12, 9, 16
C. 12, 16, 18
D. 12, 10, 20

- 2 A ladder reaches 2.4 meters up a wall. If the base of the ladder is 0.7 meter from the wall, how long is the ladder?

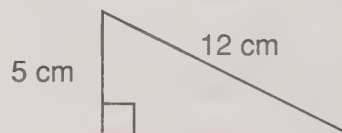


A. 1.5 meters
B. 1.7 meters
C. 2.5 meters
D. 3.1 meters

- 3 Which equation shows that 119, 120, and 169 are a Pythagorean triple?

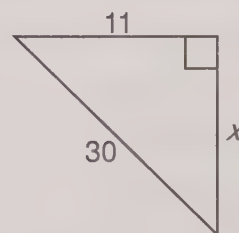
A. $119^2 \cdot 120^2 > 169^2$
B. $119^2 + 120^2 = 169^2$
C. $119^2 + 120^2 > 169^2$
D. $(119^2 + 120)^2 = 169^2$

- 4 How long is the horizontal leg of this right triangle?



A. 10.9 centimeters
B. 13 centimeters
C. 15 centimeters
D. 17.3 centimeters

- 5 Which expression represents the missing side length in this triangle?

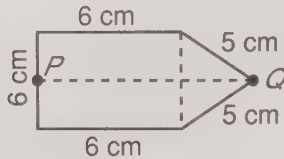


A. $\sqrt{30 - 11}$
B. $\sqrt{30 \cdot 11}$
C. $\sqrt{900 + 121}$
D. $\sqrt{900 - 121}$

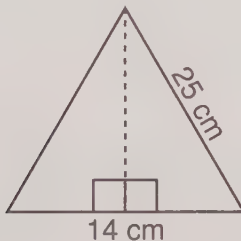
- 6 Which set of side lengths will make a right triangle?

A. 9 in., 12 in., 18 in.
B. 9 in., 40 in., 45 in.
C. 12 in., 35 in., 37 in.
D. 15 in., 35 in., 45 in.

- 7 What is the distance from P to Q ?



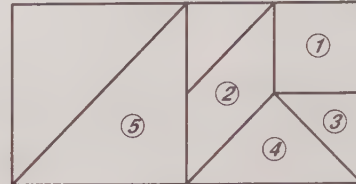
- A. 8 centimeters
B. 10 centimeters
C. 11 centimeters
D. 12 centimeters
- 8 What is the height of this isosceles triangle?



- A. 11 centimeters
B. 20.7 centimeters
C. 24 centimeters
D. 26 centimeters
- 9 The legs of a right triangle are 33 feet and 56 feet. Emily is computing the length of the hypotenuse. She found the sum of 33^2 and 56^2 . What should she do next?
- A. Subtract 33^2 from 56^2 .
B. Square the sum of 33^2 and 56^2 .
C. Take the square root of the sum.
D. Nothing. She has the answer.

Short-Response: Show your work for each question.

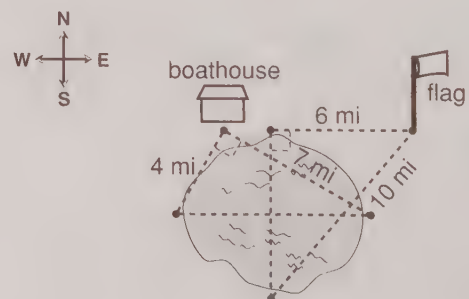
Use this figure for problems 11–13. Round each answer to the nearest tenth. Triangles 3, 4, and 5 are isosceles right triangles.



- 10 If the side of square 1 is 5 centimeters, what is the length of the hypotenuse of triangle 3?
- 11 What is the length of the hypotenuse of triangle 4?
- 12 What is the length of the hypotenuse of triangle 5?
- 13 Draw an isosceles triangle whose non-equal angle measures 30 degrees and whose non-equal side is 10 cm.
- 14 Construct a circle with radius 5 cm.

Extended-Response: Show your work for each question.

- 15 Which distance across the lake is shorter—east to west or north to south? Justify your answer.

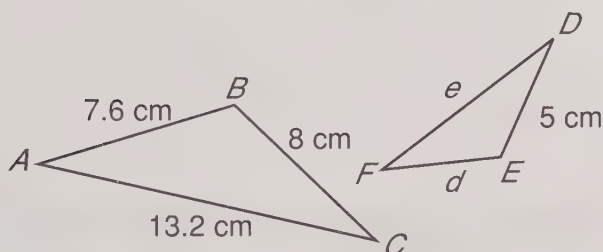


GEOMETRY**Similar Polygons**

8.G.2 Classify figures in terms of congruence and similarity, and apply these relationships to the solution of problems.

Select the best answer for each question.

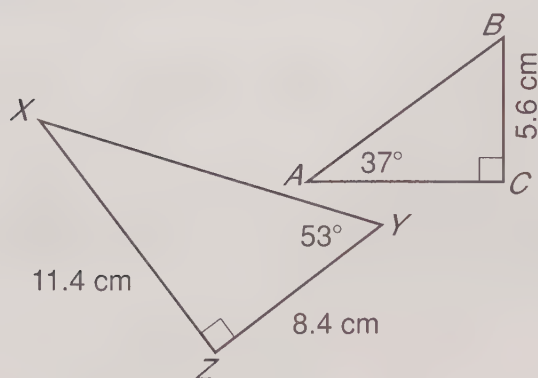
Use the triangles below for questions 1–3. $\triangle ABC$ is similar to $\triangle FED$.



- 1 What is the ratio of corresponding sides?
A. 7.6 to 5
B. 8 to 5
C. 13.2 to 7.6
D. 13.2 to 8
 - 2 Which proportion can be used to find the length of side e ?
A. $\frac{5}{x} = \frac{8}{7.6}$
B. $\frac{5}{13.2} = \frac{x}{8}$
C. $\frac{8}{5} = \frac{7.6}{x}$
D. $\frac{8}{5} = \frac{13.2}{x}$
 - 3 Find the length of side d .
A. 4.75 cm
B. 5.26 cm
C. 8.25 cm
D. 12.16 cm
- Use this figure for questions 4–5. The parallelograms are similar with a side ratio of 1 : 2.
-

- 4 What is the longer side in the smaller parallelogram?
A. 2 in.
B. 7.5 in.
C. 8 in.
D. 30 in.
- 5 What is the perimeter of the larger parallelogram?
A. 22.5 in.
B. 23 in.
C. 45 in.
D. 46 in.

Use this figure for questions 6–9.



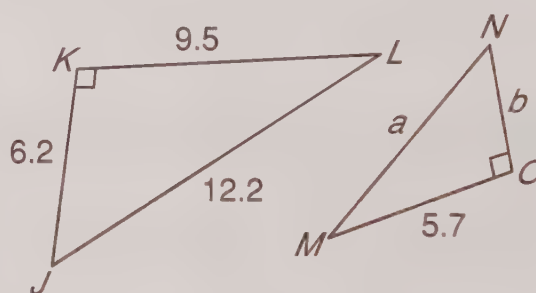
- 6 How can you prove that the triangles are similar?
- Show that both triangles are right.
 - Show that corresponding angles are congruent.
 - Show that the ratio of corresponding sides is 2 to 1.
 - Use the Pythagorean Theorem to find each hypotenuse.
- 7 Which angle in $\triangle XYZ$ measures 37° ?
- $\triangle BAC$
 - $\triangle YXZ$
 - $\triangle ZYX$
 - $\triangle YZX$
- 8 Which proportion can you use to find the length of side AC?
- $\frac{AC}{8.4} = \frac{11.4}{5.6}$
 - $\frac{AC}{11.4} = \frac{8.4}{5.6}$
 - $\frac{AC}{8.4} = \frac{5.6}{11.4}$
 - $\frac{AC}{11.4} = \frac{5.6}{8.4}$
- 9 What is the length of side \overline{AC} ?
- 4.1 cm
 - 5.8 cm
 - 7.6 cm
 - 17.1 cm

Short-Response: Show your work for each question.

- 10 The ratio of the side lengths of two similar rectangles is 5 : 2. If the perimeter of the smaller rectangle is 20 feet, what is the perimeter of the larger rectangle?
- 11 The dimensions of a picture frame are similar to those of the picture. The picture is 8 inches by 10 inches. The frame is 9 inches wide. How many inches long is the frame? Write your answer as a decimal.

Extended-Response: Show your work for each question.

- 12 $\triangle JKL \sim \triangle NOM$. Without finding the values of a and b , compare the ratio $a:b$ to the ratio 12.2:6.2. Explain. Find the values of a and b and confirm your answer.



GEOMETRY

Symmetry

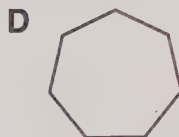
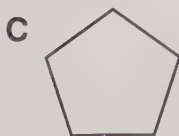
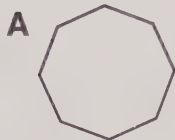
8.G.7 Identify three-dimensional figures (e.g., prisms, pyramids) by their physical appearance, distinguishing attributes, and spatial relationships such as parallel faces.

Select the best answer for each question.

- 1 A cylinder has which type(s) of symmetry?

A. axis only
B. plane only
C. axis and plane
D. no symmetry

- 2 Which figure will show rotational symmetry 8 times within one full rotation?



- 3 For which type of quadrilateral are both diagonals always lines of symmetry?

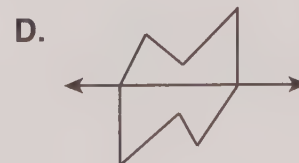
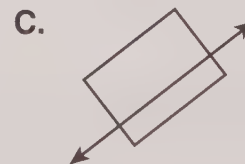
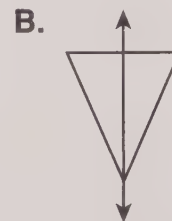
A. rectangle C. kite
B. rhombus D. trapezoid

- 4 Describe the lines of symmetry in this figure.



A. vertical only
B. horizontal only
C. both vertical and horizontal
D. neither vertical nor horizontal

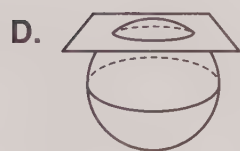
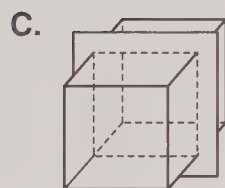
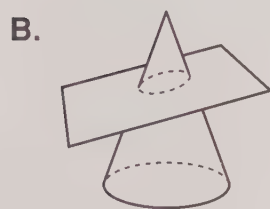
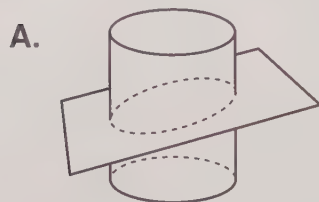
- 5 Which figure shows a line of symmetry?



- 6 Which type of triangle always has 0 lines of symmetry?

A. right
B. scalene
C. isosceles
D. equilateral

- 7 Which figure displays a plane of symmetry?



Short-Response: Show your work for each question.

- 8 What shape is the intersection of a cube with a vertical plane of symmetry?
- 9 What shape is the intersection of a sphere with one of its planes of symmetry?

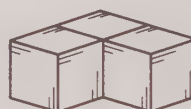
- 10 Draw or describe the intersection of this cylinder with a horizontal plane of symmetry and with a vertical plane of symmetry.



- 11 Draw a right triangle with exactly one line of symmetry. Label each angle measure and classify the triangle.

Extended-Response: Show your work for each question.

- 12 How many planes of symmetry does this figure have? Draw or describe each.



- 13 How many planes of symmetry does a tetrahedron have? Explain your answer.



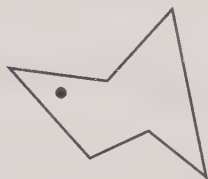
GEOMETRY

Transformations

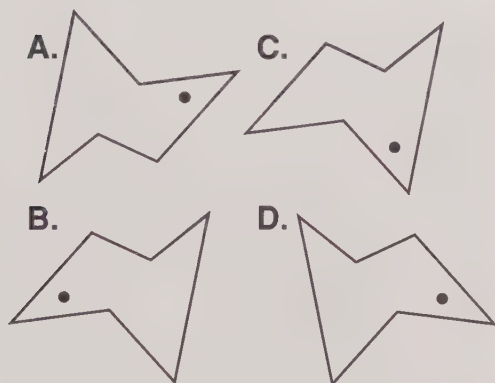
8.G.6 Predict the results of transformations on unmarked or coordinate planes and draw the transformed figure, e.g., predict how tessellations transform under translations, reflections, and rotations.

Select the best answer for each question.

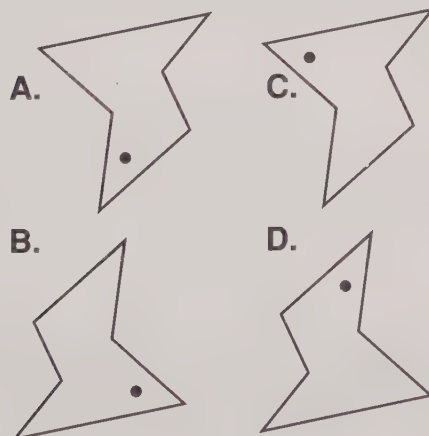
Use this figure for questions 1–3.



- 1 What does the figure look like after a reflection across a horizontal line?



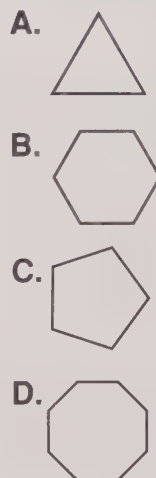
- 2 What does the figure look like after a 90° rotation clockwise?



- 3 If the figure is translated 2 inches to the right and 6 inches up, where is the dot in the translated figure?

- A. upper left corner
- B. lower left corner
- C. upper right corner
- D. lower right corner

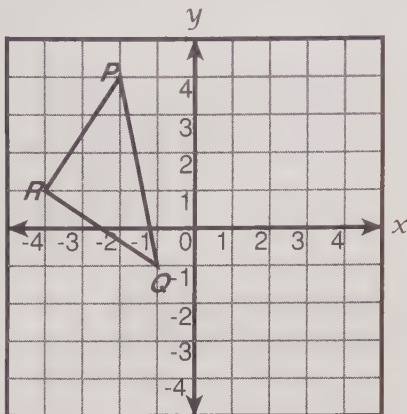
- 4 Which figure does NOT look the same after a reflection across a vertical line?



- 5 For which type of transformation is the image NOT always congruent to the original figure?

- A. dilation
- B. reflection
- C. rotation
- D. translation

Use the figure below for questions 6–8.



- 6 Where will the image of point Q be after triangle PQR is reflected across the x -axis, and then reflected across the y -axis?
- A. $(-1, 1)$ C. $(3, 1)$
 B. $(1, 1)$ D. $(2, 24)$
- 7 What are the coordinates of the image of point R after the triangle is rotated 90° clockwise about the origin?
- A. $(-1, 24)$ C. $(0, 4)$
 B. $(-1, 4)$ D. $(1, 4)$
- 8 Which translation will move point P to a point on the line $y = 5x$?
- A. right 2, down 5
 B. right 4, down 2
 C. right 4, down 4
 D. right 5, down 2

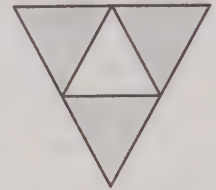
Short-Response: Show your work for each question.

- 9 In what direction will this sign point after it is rotated 180° ?



Explain your answer.

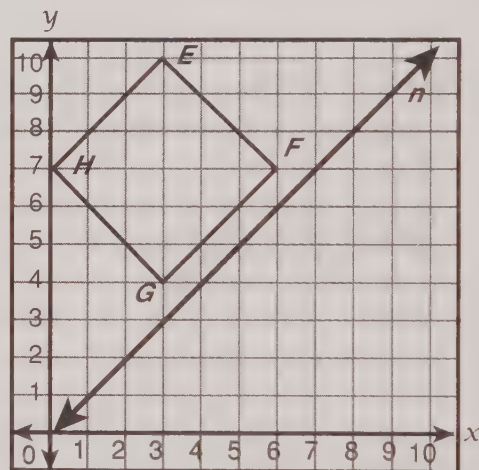
- 10 What transformation will make the bottom shaded triangle coincide with the white triangle in the center of the figure? Explain your answer.



- 11 A regular octagon has a pair of horizontal parallel sides. The octagon is rotated 90° . Describe the result.

Extended-Response: Show your work for each question.

Use the figure below for questions 12–14. A square is drawn on a coordinate grid as shown below.



- 12 Describe a translation of the square such that the image of point E is on line n .
- 13 The square is flipped across line n . What is the y -coordinate of the image of point F ? Draw the image.
- 14 Explain how to find the image of point H after the square is rotated clockwise by 90° about its center.

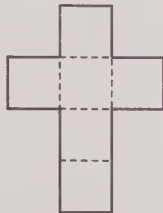
GEOMETRY

Nets

8.G.5 Use straight-edge, compass, or other tools to formulate and test conjectures, and to draw geometric figures.

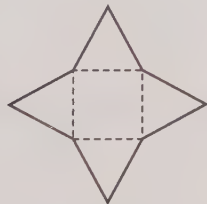
Select the best answer for each question.

- 1 Which three-dimensional figure can the net be used to make?



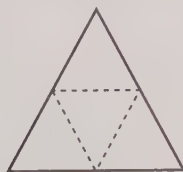
- A. triangular pyramid
- B. square pyramid
- C. tetrahedron
- D. cube

- 2 Which three-dimensional figure can the net be used to make?



- A. cube
- B. tetrahedron
- C. square pyramid
- D. triangular prism

- 3 Which three-dimensional figure can the net be used to make?

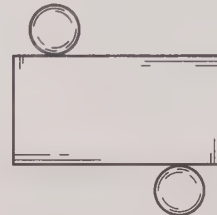


- A. cube
- B. tetrahedron
- C. square pyramid
- D. triangular prism

- 4 Which of the following statements is true of polyhedron nets?

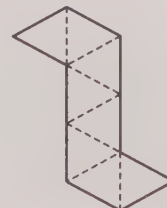
- A. There is only one net per polyhedron.
- B. There are often several net configurations for one polyhedron.
- C. A tetrahedron has no net.
- D. The net of a triangular prism has all triangular faces.

- 5 The figure below represents the net for which of the following geometric solids?



- A. cylinder
- B. cone
- C. sphere
- D. prism

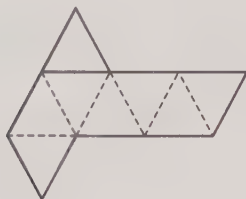
- 6 If the net below is folded into its polyhedron, how many faces will it have?



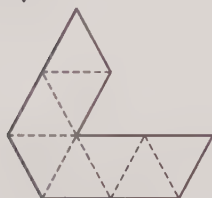
- A. 4
- B. 6
- C. 8
- D. 10

- 7 Which of the following nets will NOT form an octahedron?

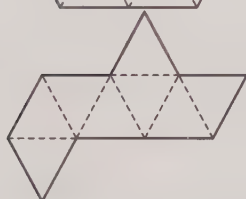
A.



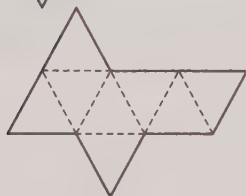
B.



C.

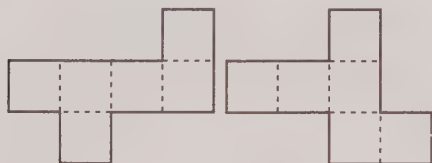


D.

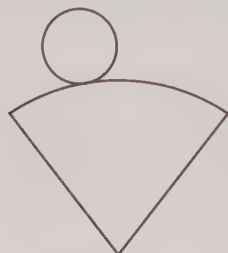


Short-Response: Show your work for each question.

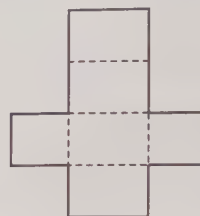
- 8 Could both of these nets be folded into cubes? Explain.



- 9 Classify the three-dimensional figure that can be formed by the following net. Explain your answer.



- 10 What solid is formed by the net below?

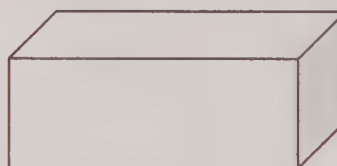


Extended-Response: Show your work for each question.

- 11 Draw a net for the following figure and classify the shapes of the faces in the net.



- 12 Compare the nets for the following three-dimensional figures.



MEASUREMENT**Convert Between Measurement Systems**

8.M.2 Given the formulas, convert from one system of measurement to another. Use technology as appropriate.

Select the best answer for each question.

- 1** One inch is about 2.5 centimeters. About how many inches long is a 16-centimeter stapler?

A. about 4 inches
B. about 6 inches
C. about 15 inches
D. about 32 inches

- 2** What is the approximate mass of a 9-pound bowling ball?

Use 1 pound \approx 454 grams.

A. about 4.08 kilograms
B. about 40 kilograms
C. about 408 kilograms
D. about 4,080 kilograms

- 3** About how many liters of water does this bottle hold?



Use 1 quart \approx 1.1 liters.

A. about 1.1 quarts
B. about 2.8 quarts
C. about 3.0 quarts
D. about 3.2 quarts

- 4** The number of degrees Celsius is about half of 30 less than the equivalent number of degrees Fahrenheit. The outside temperature is 868°F. About what temperature is this in degrees Celsius?

A. about 138°C
B. about 288°C
C. about 388°C
D. about 588°C

- 5** One gallon is approximately the same as 4.4 liters. About how many gallons of gas are needed to fill a fuel tank that holds 50 liters?

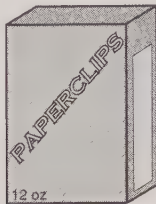
A. about 11 gallons
B. about 86 gallons
C. about 54 gallons
D. about 220 gallons

- 6** One mile is about 1.6 kilometers. Sarah lives 8 miles from the park. About how many kilometers does she live from the park?

A. about 7.5 kilometer
B. about 12.8 kilometers
C. about 21.2 kilometers
D. about 24.8 kilometers

- 7 One kilogram is about 2.2 pounds. About what is the mass in kilograms of a 55-pound dog?
- A. about 25 kilograms
 - B. about 37 kilograms
 - C. about 121 kilograms
 - D. about 136 kilograms

- 8 One ounce is about 30 grams. What is the approximate mass of this box of paperclips?



- A. about 2.5 grams
 - B. about 240 grams
 - C. about 360 grams
 - D. about 480 grams
- 9 One centimeter is about 0.4 inch. What is the perimeter in inches of this square?



- A. about 44.8 inches
- B. about 32 inches
- C. about 11.2 inches
- D. about 4.5 inches

Short-Response: Show your work for each question.

- 10 One quart is approximately 1.1 liters. Each morning, Tom fills a 6-quart jug with water. To the nearest tenth, about how many liters of water does Tom use each week?
- 11 Naji saw this sign as she rode past the bank. She knows that the number of degrees Fahrenheit is about 30 more than twice the equivalent number of degrees Celsius. About what is the temperature in degrees Fahrenheit?



- 12 One pound is about 450 grams. What is the approximate weight in pounds of 6 boxes with a mass of 8 kilograms each? Round your answer to the nearest whole number.

Extended-Response: Show your work for each question.

- 13 Compare the unit cost of soda for the following: a 3-liter bottle for \$2.79, a 12-pack of 12-ounce cans for \$3.99, and a 6-pack of 500-milliliter bottles for \$3.25. Use 1 ounce \approx 30 milliliters.

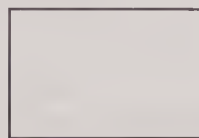
MEASUREMENT**Convert Within Measurement Systems**

8.M.1 Select, convert (within the same system of measurement), and use appropriate units of measurement or scale.

Select the best answer for each question.

- 1** How many 4-inch-long pegs can Tony cut from a wooden rod that is 2 yards long?
- A. 2
B. 6
C. 8
D. 18

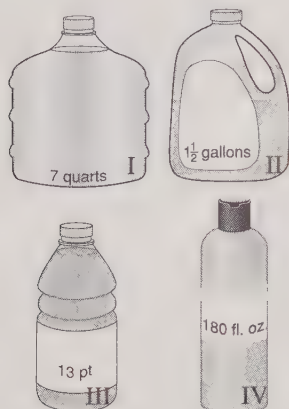
- 2** This rectangle has an area of 1 square foot. What is its width?



- A. $2\frac{2}{3}$ inches
B. 3 inches
C. 9 inches
D. 16 inches
- 3** Which measurement is equivalent to 24 milliliters?
- A. 0.024 liter
B. 0.24 liter
C. 2.4 liters
D. 2,400 liters

- 4** A fully loaded semitruck and trailer weigh $32\frac{1}{2}$ tons. What is the weight in pounds?
- A. 32,500 pounds
B. 64,005 pounds
C. 64,500 pounds
D. 65,000 pounds
- 5** Marina needs 38 feet of wallpaper border to go around her bedroom. Which of the following is NOT another way to describe the length of border she needs?
- A. 11 yards 60 inches
B. $12\frac{2}{3}$ yards
C. 114 yards
D. 456 inches
- 6** A small rug has an area of 6 square feet. What is its area in square inches?
- A. 60 square inches
B. 72 square inches
C. 600 square inches
D. 864 square inches
- 7** Which measurement is equivalent to 0.007 grams?
- A. 7 milligrams
B. 7 kilograms
C. 700 milligrams
D. 7000 milligrams

- 8 Which lists the bottles in order from least to greatest capacity?



- A. IV, II, III, I
B. II, I, III, IV
C. II, IV, III, I
D. III, I, IV, II
- 9 The area of a trapezoid is 0.75 square meter. Which is another way to describe the area of the trapezoid?
- A. 7.5 square centimeters
B. 75 square centimeters
C. 750 square centimeters
D. 7,500 square centimeters
- 10 How many 10-ounce paper cups can Rico fill with a 1-gallon container of juice?
- A. 3
B. 10
C. 12
D. 13

Short-Response: Show your work for each question.

- 11 A store advertised a sale on carpet. What is the cost in dollars of the carpet per square foot?

Carpet Sale:
10 square yards
Only \$300

- 12 Isabelle bought a 2-pound bag of nuts. To the nearest whole number, how many 0.75 ounce servings of nuts are in the bag?
- 13 Joel filled 22 quart bottles with freshly squeezed orange juice.
- How many gallons of orange juice did Joel make?
- 14 A poster measures 2 meters by 1.2 meters. What is the area of the poster in square centimeters? Show your work.

Extended-Response: Show your work for each question.

- 15 Susanna rides her bicycle on the weekends. She usually rides 20 miles in $1\frac{1}{2}$ hours. Explain how to find Susanna's speed in feet per minute.

MEASUREMENT

Estimate Measures

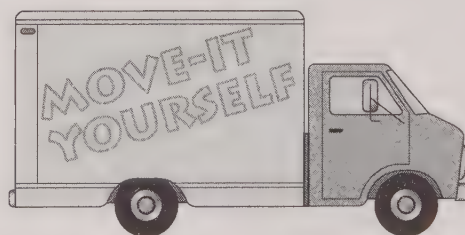
8.M.1 Select, convert (within the same system of measurement), and use appropriate units of measurement or scale.

Select the best answer for each question.

- 1 Which is most likely the height of an adult woman?
 - A. 1.65 centimeters
 - B. 1.65 feet
 - C. 1.65 inches
 - D. 1.65 meters
- 2 Which is most likely the area of a rectangular flat television screen?
 - A. 6 square feet
 - B. 6 square inches
 - C. 6 square miles
 - D. 6 square yards
- 3 Which unit of measure would be most appropriate to find the space inside a box used to ship a pottery vase?
 - A. cubic centimeters
 - B. cubic kilometers
 - C. cubic meters
 - D. cubic millimeters
- 4 Which unit of measure is most likely missing from this sign?
 - A. centimeters
 - B. feet
 - C. inches
 - D. miles



- 5 Which unit of measure would be most appropriate to use to measure the base of a can of vegetables?
 - A. centimeters
 - B. kilometers
 - C. meters
 - D. feet
- 6 Meg said that a basketball court is about 44 units long. Which of these units is Meg most likely using?
 - A. centimeters
 - B. kilometers
 - C. meters
 - D. millimeters
- 7 The dimensions of the cargo space in this truck are 23 units by 7.5 units by 8 units. What is most likely the length of the truck's cargo space?

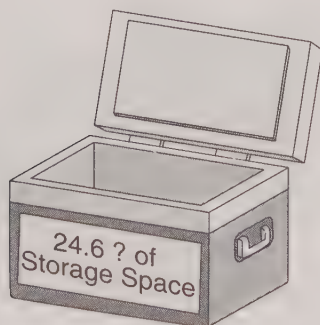


- A. 23 feet
- B. 23 inches
- C. 23 miles
- D. 23 yards

- 8 Trevor measured several features of the pool in his apartment complex. However, when he recorded his findings, he forgot to record the units of measure he used. One measurement he recorded is 8.

What feature would this measurement most likely represent?

- A. the area of the pool bottom in square feet
 - B. the depth of the pool in inches
 - C. the length of the pool in yards
 - D. the volume of the pool in cubic yards
- 9 A rectangular classroom is 12 yards long. It is not as wide as it is long. Which could be the area of the floor?
- A. 18 square feet
 - B. 18 square yards
 - C. 108 square yards
 - D. 1080 square feet
- 10 What unit is missing from the sign on this freezer that Marta plans to buy for her house?



- A. cubic feet
- B. cubic inches
- C. cubic miles
- D. cubic yards

Short-Response: Show your work for each question.

- 11 Students in Mr. Martin's math class worked in groups of three to find the area occupied by their school bookstore in square feet, square inches, and square yards. The numbers of units the students in one group found are 400; 44.4; and 57,600. What is the area of the bookstore in square feet?
- 12 Which is the most likely number of meters of wood Roberto would use to make a frame for a photo of his family to put on his desk: 0.64, 6.4, 64, or 640?
- 13 Pamela found the length of her bedroom using centimeters, meters, inches, and feet. The numbers of units she found are: 10, 305, 120, and 3. How many inches long is Pamela's bedroom?

Extended-Response: Show your work for each question.

- 14 Audrey's bedroom is 12 feet by 14 feet. The walls are 8 feet high. She wants to paint her room. A gallon of paint will cover about 400 square feet of wall. If Audrey puts 2 coats of paint on the walls, about how many gallons will she need to buy? Audrey wants to paint the ceiling a different color. If she puts two coats on the ceiling, about how many quarts will she need to buy? Explain.

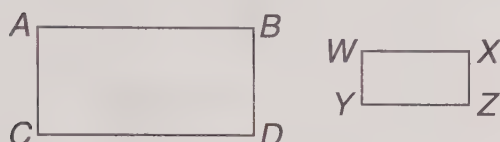
MEASUREMENT

Effects of Changing Dimensions

8.M.4 Use ratio and proportion (including scale factors) in the solution of problems, including problems involving similar plane figures and indirect measurement.

Select the best answer for each question.

- 1 Rectangle $ABCD$ is similar to rectangle $WXYZ$.



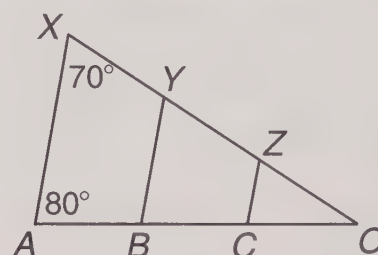
If the scale factor used to dilate $WXYZ$ to $ABCD$ is 3.5, what is the relationship between the perimeters of the two rectangles?

- A. The perimeter of $ABCD$ is less than $3\frac{1}{2}$ times the perimeter of $WXYZ$.
- B. The perimeter of $ABCD$ is equal to the perimeter of $WXYZ$.
- C. The perimeter of $ABCD$ is approximately one-third the perimeter of $WXYZ$.
- D. The perimeter of $ABCD$ is 3.5 times the perimeter of $WXYZ$.

- 2 Triangle ABC is dilated by a scale factor of 3 to create triangle $A'B'C'$. What is the relationship between the areas of the triangles?

- A. The area of $\triangle ABC$ is 3 times the area of $\triangle A'B'C'$.
- B. The area of $\triangle A'B'C'$ is 3 times the area of $\triangle ABC$.
- C. The area of $\triangle ABC$ is 9 times the area of $\triangle A'B'C'$.
- D. The area of $\triangle A'B'C'$ is 9 times the area of $\triangle ABC$.

In the figure below, segments AX , BY , and CZ are parallel. Segments AB , BC , and CO are congruent. Use the figure for questions 3–5.



- 3 Triangle BYO has a perimeter of 14 centimeters and triangle AXO has a perimeter of 22.4 centimeters. What is the scale factor that would dilate $\triangle BYO$ to $\triangle AXO$?
- A. 8.4
 - B. 4.5
 - C. 1.6
 - D. 0.625
- 4 If \overline{CO} is 10 centimeters, what is \overline{AC} ?
- A. 30 cm
 - B. 20 cm
 - C. 15 cm
 - D. 10 cm
- 5 If CO is 1 centimeter and \overline{CZ} is 0.5 centimeters, what is \overline{AX} ?
- A. 0.5
 - B. 1.0
 - C. 1.5
 - D. 2.0

- 6 The area of square $ABCD$ is 546 square meters. What is the area of a square whose side length is half that of square $ABCD$?

A. 136.5 square meters
B. 144 square meters
C. 273 square meters
D. 409.5 square meters

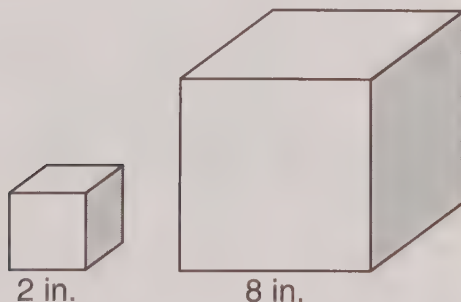
- 7 The volumes of two cubes are 125 cubic feet and 1000 cubic feet. What is the ratio of the edge length of the smaller cube to that of the larger cube?

A. 1 : 2 C. 3 : 5
B. 2 : 3 D. 4 : 7

- 8 The volume of Cylinder A is 50.24 cubic inches. Cylinder B is larger than Cylinder A by a scale factor of 2. What is the volume of Cylinder B ?

A. 100.48 cubic inches
B. 200.96 cubic inches
C. 301.44 cubic inches
D. 401.92 cubic inches

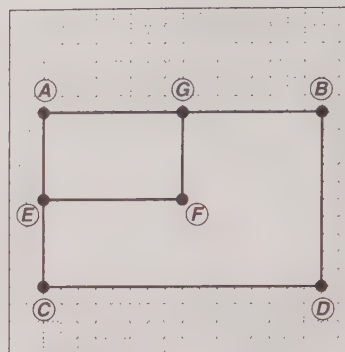
- 9 What is the ratio of the surface area of the smaller cube to that of the larger cube?



A. 1 : 2 C. 1 : 8
B. 1 : 4 D. 1 : 16

Short-Response: Show your work for each question.

Use the figure below for problems 10–11. Rectangle $ABCD \sim$ rectangle $AGFE$. EF is 8 centimeters.

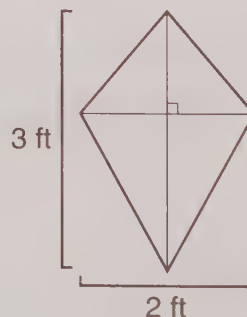


- 10 How long is \overline{CD} ? What is the ratio of the perimeter of $ABCD$ to the perimeter of $AGFE$?

- 11 What is the ratio of the area of $ABCD$ to the area of $AGFE$?

Extended-Response: Show your work for each question.

- 12 Marcus is designing a kite for a kite contest. His first design is shown below.



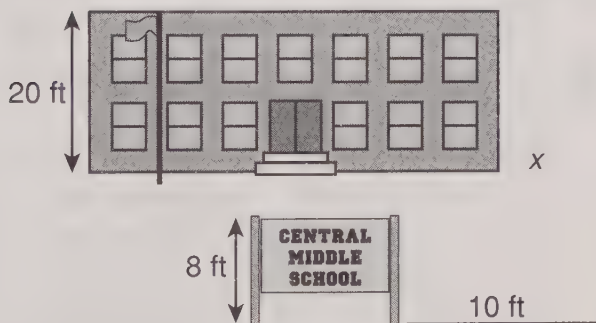
What is the area of his kite? Marcus decides to increase both dimensions by 1.5. What are the new dimensions? What is the area of the new kite? By what factor has the area increased?

MEASUREMENT**Indirect Measurement**

8.M.4 Use ratio and proportion (including scale factors) in the solution of problems, including problems involving similar plane figures and indirect measurement.

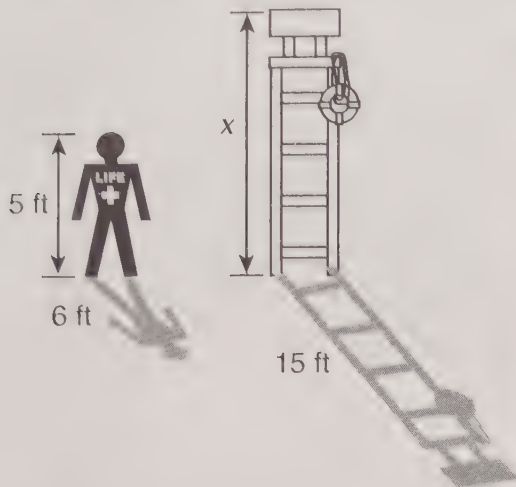
Select the best answer for each question.

- 1 A 30-foot building casts a 40-foot shadow. An 18-foot-tall tree stands next to the building. How long a shadow does the tree cast?
- A. 6.7 feet
B. 13.5 feet
C. 24 feet
D. 28 feet
- 2 An 8-foot sign casts a shadow 10 feet long. How long of a shadow does the building behind it cast?



- A. 4 feet
B. 16 feet
C. 22 feet
D. 25 feet
- 3 A lamppost stands next to a 20-foot pine tree. When the tree casts a shadow 25 feet long, the lamppost casts a shadow 16 feet long. How tall is the lamppost?
- A. 11 feet
B. 12.8 feet
C. 20 feet
D. 31.25 feet
- 4 Mr. Swanson planted a young 8-foot tree in front of his house. The tree cast a shadow 15 feet long. At the same time, the house cast a shadow 45 feet long. How tall is the house?
- A. 24 feet
B. 38 feet
C. 52 feet
D. 84.4 feet
- 5 Marie is standing next to a sunflower in her garden. The sunflower is 5 feet tall and casts a 4-foot shadow. Marie is 5 feet 6 inches tall. How long is her shadow to the nearest inch?
- A. 3 feet 6 inches
B. 4 feet 5 inches
C. 6 feet 11 inches
D. 14 feet 6 inches
- 6 Seth casts a shadow 7.2 meters long at the same time that the tree he is standing by casts a shadow 40 meters long. If the tree is 10 meters tall, how tall is Seth?
- A. 1.8 meters
B. 2.5 meters
C. 4.2 meters
D. 28.8 meters

- 7** A lifeguard stand casts a shadow that is 15 feet long. A 5-foot-tall person standing nearby casts a shadow 6 feet long. What is the height of the lifeguard stand?



- A. 12.5 feet
B. 14 feet
C. 18 feet
D. 20 feet
- 8** The tallest tomato plant in Fran's garden is 4 feet tall and casts a shadow 30 inches long. The shortest tomato plant is only 18 inches tall. How long a shadow does it cast?
- A. 11.25 inches
B. 28.8 inches
C. 44 inches
D. 135 inches
- 9** The flagpole at Angie's school casts a shadow 40 meters long. If Angie is 1.5 meters tall and casts a shadow 6 meters at the same time of day, what is the height of the flagpole?
- A. 10 meters C. 45.5 meters
B. 22.5 meters D. 160 meters

Short-Response: Show your work for each question.

- 10** Shannon is 5.4 feet tall and casts a shadow 8 feet long. She is standing beneath the Gateway Arch in St. Louis, MO, which has a height of 630 feet. About how long a shadow does the arch cast?
- 11** Martin is 75 inches tall. On a sunny day, his shadow is 110 inches. If the shadow of a nearby oak tree is 80 feet, about how tall is the oak tree?
- 12** Toni is 5.7 feet tall and casts a shadow 10 feet long. She is standing beside her house that is 25 feet tall. To the nearest tenth, how long a shadow does her house cast?

Extended-Response: Show your work for each question.

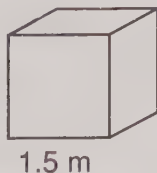
- 13** The Statue of Liberty is 46.5 meters tall. Sean and a friend visited the statue, and wanted to know how long of a shadow it cast. They measured Sean's height to be 168 centimeters and the length of his shadow to be 210 centimeters. Explain how they could use a proportion to find the length of the statue's shadow

MEASUREMENT**Surface Area and Volume**

8.M.3 Demonstrate an understanding of the concepts and apply formulas and procedures for determining measures, including those of area and perimeter/circumference of parallelograms, trapezoids, and circles. Given the formulas, determine the surface area and volume of rectangular prisms, cylinders, and spheres. Use technology as appropriate.

Select the best answer for each question.

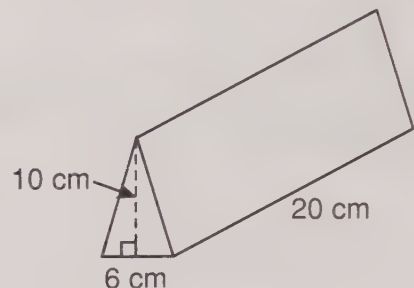
- 1 Mr. Chavez has a circular wading pool in his garden. If the pool has a depth of 8 inches and a diameter of 10 feet, what is the approximate volume of the wading pool? Use 3.14 for π .
- A. 52.33 cubic feet
B. 1,256 cubic feet
C. 7,536 cubic feet
D. 90,432 cubic feet
- 2 What is the volume of a rectangular prism that has a length of 15 centimeters, a width of 25 centimeters, and a height of 32 centimeters?
- A. 72 cubic centimeters
B. 216 cubic centimeters
C. 1,944 cubic centimeters
D. 12,000 cubic centimeters
- 3 What is the surface area of the cube to the nearest hundredth?



- A. 2.25 square meters
B. 3.38 square meters
C. 9.00 square meters
D. 13.5 square meters

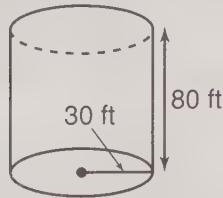
- 4 A can has a radius of 2.4 inches and a height of 9.5 inches. What is the area of a label that goes all around the can? Use 3.14 for π . Round your answer to the nearest tenth.
- A. 71.6 square inches
B. 143.2 square inches
C. 171.8 square inches
D. 179.4 square inches

- 5 What is the volume of the prism?

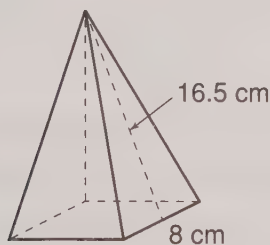


- A. 150 cubic centimeters
B. 600 cubic centimeters
C. 760 cubic centimeters
D. 1,200 cubic centimeters

- 6 Approximately how many square feet of sheet metal are needed to make the storage tank shown?
Use 3.14 for π .



- A. 56,520 square feet
B. 20,724 square feet
C. 10,362 square feet
D. 7,536 square feet
- 7 The volume of a cube is 64 cubic feet. What is the length of one edge of the cube?
- A. 4 feet C. 12.5 feet
B. 8 feet D. 262,144 feet
- 8 This pyramid has a square base. What is the surface area of the figure in square centimeters?

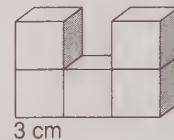


- A. 262 square centimeters
B. 264 square centimeters
C. 328 square centimeters
D. 528 square centimeters

- 9 A manufacturer ships coffee mugs in boxes that are 4 inches by 4 inches by 3.5 inches. Then, he packages as many boxes as possible inside a shipping box that measures 18 inches by 18 inches by 20 inches. How much space is left inside the shipping box for packaging material?
- A. 40 cubic inches
B. 880 cubic inches
C. 6424 cubic inches
D. 6480 cubic inches

Short-Response: Show your work for each question.

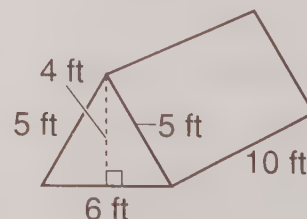
- 10 What is the surface area of the figure shown below?



- 11 A rectangular prism is 2 inches by 4 inches by 6 inches. Another rectangular prism has dimensions that are three times as long. How much greater is the volume of the second prism than the first prism?
- 12 The surface area of a cube is 150 square centimeters. What is the length of one edge of the cube?

Extended-Response: Show your work for each question.

- 13 Compare the volume and surface area of the triangular prism below with the volume and surface area of a 3-foot by 2-foot by 10-foot rectangular prism.



DATA ANALYSIS, STATISTICS, AND PROBABILITY**Displays of Data**

8.D.2 Select, create, interpret, and utilize various tabular and graphical representations of data, e.g., circle graphs, Venn diagrams, scatterplots, stem-and-leaf plots, box-and-whisker plots, histograms, tables, and charts. Differentiate between continuous and discrete data and ways to represent them.

Select the best answer for each question.

- 1** Jessica recorded the noon temperature in her backyard each day for 30 consecutive days. Which type of graph can she use to show the noon temperature trend over that time?

A. circle graph
B. histogram
C. line graph
D. box-and-whisker plot

- 2** Mr. Feldman calculates that he spends \$2,000 per month to rent his work space. He spends \$8,000 in all per month to operate his business.

If Mr. Feldman makes a circle graph to show his business expenses, what percent of the circle graph will represent the portion spent on rent?

A. 20% C. 40%
B. 25% D. 50%

- 3** In a set of 20 data values, 5 occurs 6 times, 8 occurs 8 times, 10 occurs 2 times, and 11 occurs 4 times. How can this data NOT be represented?

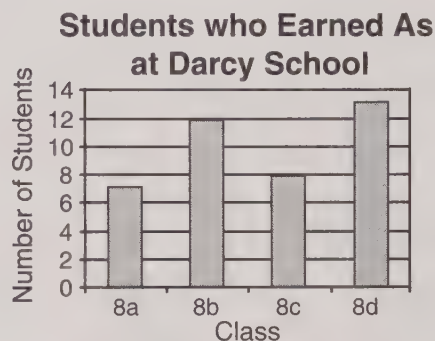
A. histogram C. line graph
B. bar graph D. circle graph

- 4** Which type of graph can you use to find a relationship between y and x ?

x	1	2	3	4	5	6
y	4	6	8	7	10	11

A. histogram C. bar graph
B. circle graph D. scatterplot

- 5** Which table matches the data in the graph?



- A.

8a	8b	8c	8d
6	12	8	12
- B.

8a	8b	8c	8d
7	12	8	13
- C.

8a	8b	8c	8d
6	12	9	12
- D.

8a	8b	8c	8d
8	12	8	13

- 6** To represent how separate expenses in a month relate to the total amount spent in a month, which type of graph can you use?

A. circle graph C. bar graph
B. histogram D. line graph

The following stem-and-leaf plot shows how much money students from two grades raised at the school fair. Use the plot to answer questions 7–9.

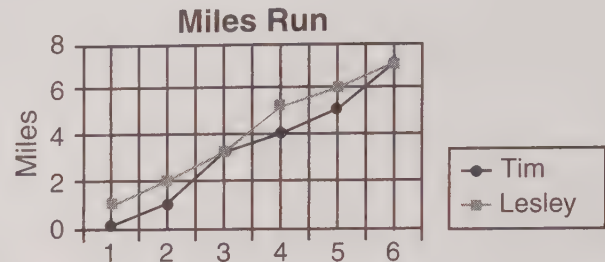
Grade 7		Grade 8
Leaf	Stem	Leaf
3 6 5	10	0 3 3 6
3 5 6 6 9	20	1 4 6 8 9
0 2 2	30	0 1 4

Key: 20|4 means \$24
2|30 means \$32

- 7 According to the plot, how many students in each class raised exactly \$13?
- A. 1 in Grade 7 and 1 in Grade 8
B. 2 in Grade 7 and 1 in Grade 8
C. 1 in Grade 7 and 2 in Grade 8
D. 2 in Grade 7 and 2 in Grade 8
- 8 How much did students in Grade 8 raise in all?
- A. \$75 C. \$262
B. \$175 D. \$275
- 9 Which of the following statements is true?
- A. There are the same number of students in both grades.
B. Grade 8 had more students raise over \$30 than Grade 7 did.
C. One student in each grade raised exactly \$16.
D. The student who raised the most money is in Grade 8.

Short-Response: Show your work for each question.

Use the line graph below to answer questions 10–12.



- 10 How many miles did Lesley and Tim run in the 6 days altogether?
- 11 At what point or points were Lesley and Tim tied for the number of miles run?
- 12 Who had run more miles after 4 days and by how much?

Extended-Response: Show your work for each question.

- 13 Lindsey surveyed her classmates about the number of siblings they have. The table below shows the results of her survey.

Siblings	0	1	2	3	4	5	6	7	8	9	10
Students	2	4	4	1	2	0	1	0	0	1	0

Draw a line plot of the data in the table. Draw a histogram of the data in the table. Which data display is more useful? Explain.

DATA ANALYSIS, STATISTICS, AND PROBABILITY

Measures of Data

8.D.3 Find, describe, and interpret appropriate measures of central tendency (mean, median, and mode) and spread (range) that represent a set of data. Use these notions to compare different sets of data.

Select the best answer for each question.

- 1** Set X is a set of numbers. Set Y consists of the numbers in set X each multiplied by 4. Which of the following is true?

A. Sets X and Y have the same mean.
 B. The mean of set Y is 4 times the mean of set X .
 C. The mean of set Y is 4 more than the mean of set X .
 D. The mean of set Y is one fourth the mean of set X .

- 2** Set X is a set of numbers. Set Y consists of the numbers in set X each increased by 4. Which of the following is true?

A. Sets X and Y have the same range.
 B. The range of set X is 4 more than the range of set Y .
 C. The range of set X is 4 less than the range of set Y .
 D. The range of set Y is 4 more than the range of set X .

- 3** A data set consists of 10 numbers. Nine of them are 5. Which best describes the data value 5?

A. mean C. mode
 B. median D. range

- 4** A set of data contains exactly 24 numbers. The range of the data set is 0. Which of the following is true?

A. The mean of the data is 0.
 B. All of the data values are the same number.
 C. The median of the data is 0.
 D. All of the data values are different from one another.

- 5** The table shows selected monthly salaries in dollars of some employees in a company. Which measure best represents the distribution of the data?

2000	2000	10,000	2000
2000	2000	2000	2000
3000	2000	2000	3000
2000	2000	2000	2000
2000	2000	2000	2000

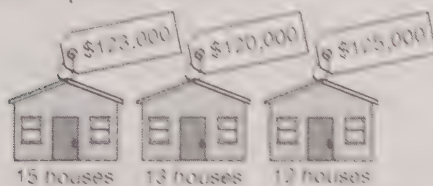
A. mode
 B. the sum of the salaries
 C. mean
 D. range

- 6** Sammy visited 12 local stores that sell music videos. He recorded the prices of one specific music video. Which of the following measures would best describe the price someone might expect to pay for the video?

A. range C. mode
 B. median D. mean

- 7** Which of the following data sets is best described by calculating the mean?
- A. 12, 11, 12, 10, 11, 11, 12, 13
 - B. 2, 2, 3, 2, 98, 99, 97, 98, 98
 - C. 11, 12, 11, 12, 13, 11, 11, 245
 - D. 0, 212, 211, 213, 213, 245, 245
- 8** Mr. Hohmann wants to find the number x that will help him separate 18 test scores into two groups. One group of scores will be less than x . The other set of scores will be greater than x . Which measure will help him do that?
- A. range
 - B. mode
 - C. median
 - D. mean

- 9** The diagram below shows a sampling of prices for homes in Matilda's town. Which measure best describes the home price data?



- A. the most frequently occurring price in the set of home prices
 - B. the mean of the prices of the homes in the sample
 - C. average of the number of homes in the sample
 - D. the total number of homes in the sample
- 10** Which set of data values has the greatest range but the smallest median?
- A. 1, 98, 98, 98, 101
 - B. 1, 2, 50, 98, 101
 - C. 3, 4, 4, 4, 103
 - D. 5, 20, 30, 90, 101

Short-Response: Show your work for each question.

Use the data set 4, 7, 8, 12, 13, 16 for questions 11–13.

- 11** What is the mean of the data set?
- 12** What would the mean of the data set be if each number in the set were increased by 72?
- 13** The weights of the starting players on the football team are 148 lb, 151 lb, 155 lb, 160 lb, 162 lb, 162 lb, 164 lb, 168 lb, 171 lb, 172 lb, and 180 lb. What is the median weight in pounds?

Extended-Response: Show your work for each question.

- 14** The following chart shows the number of runs scored by four baseball teams in their games so far this year. If you want to join the best team, which should you pick? Explain your answer.

Jays	Angels	Cosmics	Redwings
4	4	3	2
8	2	8	10
2	12	4	5
2	no game	no game	3

- 15** Chris earned \$5, \$8, \$9, and \$12 doing four odd jobs. How much does the next job have to pay for the mean to be \$10? Explain your answer.
- 16** A data set contains the numbers 1, 2, 3, 5. What number could be added to this set to make the mean equal to the median? Explain your answer.

DATA ANALYSIS, STATISTICS, AND PROBABILITY**Theoretical Probability**

8.D.4 Use tree diagrams, tables, organized lists, basic combinatorics ("fundamental counting principle"), and area models to compute probabilities for simple compound events, e.g., multiple coin tosses or rolls of dice.

Select the best answer for each question.

- 1** Roshanna has a number cube numbered 1–6. What is the theoretical probability of Roshanna rolling a 3 or 4 on one roll of a number cube?
 - A. 16.7%
 - B. 20%
 - C. 25%
 - D. 33.3%
- 2** If Roshanna rolls two number cubes at the same time, which theoretical probability is greatest?
 - A. Rolling a 1 and a 4.
 - B. Rolling two even numbers.
 - C. Rolling two 5s.
 - D. Rolling a 2 and a 3.
- 3** Bryan will toss 1 coin and will record his results. What is the theoretical probability of getting two heads in two tosses of a coin?
 - A. 6.25%
 - B. 12.5%
 - C. 25%
 - D. 37.5%
- 4** What is the theoretical probability of getting five tails in five consecutive tosses?
 - A. $\frac{1}{64}$
 - B. $\frac{1}{32}$
 - C. $\frac{1}{16}$
 - D. $\frac{1}{8}$
- 5** Sasha has a spinner that is divided into 3 equal-sized sections. Sasha will spin the spinner 30 times. How many times should Sasha expect the pointer to land on section 2?
 - A. 2
 - B. 5
 - C. 10
 - D. 15
- 6** If a family has five boys in a row, what is the theoretical probability that the next child will be a girl?
 - A. $\frac{1}{32}$
 - B. $\frac{1}{16}$
 - C. $\frac{1}{8}$
 - D. $\frac{1}{2}$

Students at Newtown Regional Middle School come from Districts A, B, and C. The following graph shows the number of students at Tri-City High from each town. Use the graph for questions 7–9.



7 What is the probability that a student picked at random is from District B?

- A. 6% C. 30%
B. 12% D. 35%

8 What is the probability that a student picked at random does NOT come from District C?

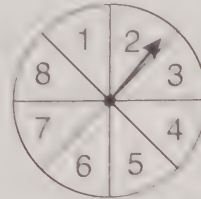
- A. 45% C. 60%
B. 55% D. 70%

9 Kyle tossed a number cube numbered 1–6 several times. He tossed a 2 four times. If the experimental probability matches the theoretical probability, what is the best estimate of the total number of times that Kyle tossed the cube?

- A. 10 C. 24
B. 15 D. 30

Short-Response: Show your work for each question.

10 Vera will conduct an experiment with the spinner shown below.



What is the probability that the pointer will land on 2 or 3?

Extended-Response: Show your work for each question.

11 Bingo balls are numbered 1 to 75. They are placed in a wire basket and spun so that one ball randomly drops out at a time. The ball is not replaced in the basket. Each column contains numbers within the range shown in the table.

B	I	N	G	O
1–15	16–30	31–45	46–59	60–75

Compare the probabilities for drawing a number in each column.

12 What are the chances of getting either four heads or four tails in four flips of a coin? Draw a diagram or a chart showing the possible outcomes and mark the ones that have either four heads or four tails.

13 A bowl contains 27 jelly beans, all of which are red. How many yellow jelly beans would have to be added to the bowl so that the probability of picking a red jelly bean is 60%? Explain.

DATA ANALYSIS, STATISTICS, AND PROBABILITY**Surveys of Samples**

8.D.1 Describe the characteristics and limitations of a data sample. Identify different ways of selecting a sample, e.g., convenience sampling, responses to a survey, random sampling.

Select the best answer for each question.

Researchers tried various ways of estimating the percentage of students who inline skate. Use this information for questions 1–3.

- 1** Researchers called students' parents to ask how often their children inline skate after school. What is wrong with this sampling method?

 - A. Parents also may inline skate.
 - B. Parents cannot monitor their children's activities during the day.
 - C. Parents may not know whether their children inline skate in the afternoon.
 - D. Parents may be biased against this study.
- 2** Researchers watched students going to school in the morning and counted the number who were inline skating. Which answer is NOT a potential problem with this sampling method?

 - A. More students who drive or get rides may inline skate.
 - B. More students may inline skate at other times of the day.
 - C. Students may have a first-period exam.
 - D. Students may not want to inline skate to school because they will have to change their shoes when they get there.
- 3** Researchers asked students if they inline skate. What is the problem with data from direct questioning like this?

 - A. The subjects may want to be paid for answering.
 - B. The subjects would know not to talk to strangers.
 - C. The subjects may think the researchers work for a skate company.
 - D. The subjects may not answer questions accurately.
- 4** A researcher watched students at a block party in his neighborhood to see how many were eating hot dogs. Why is this sometimes called a "convenience sample"?

 - A. It is convenient for students to go to a party in their own neighborhood.
 - B. It is convenient for the researcher to use nearby subjects.
 - C. Because hot dogs are often purchased at a convenience store.
 - D. Hot dogs would be conveniently available to people at a party.
- 5** What is a problem with an inference based on a convenience sample?

 - A. A sample of fewer than 50 people is not valid.
 - B. The sample may not reflect the overall population.
 - C. It is too easy and convenient.
 - D. People may not be honest in their answers.

A candidate for eighth grade student council wants to poll voters to see how well her campaign is doing. Use this information for questions 6–9.

- 6** What is wrong with polling students during first lunch?
- A. They may not be representative of students in the whole grade.
 - B. It is illegal to conduct a poll in a lunch line.
 - C. They will be too hungry.
 - D. They are more likely to favor the incumbent representative.
- 7** What is the biggest problem with posting signs asking students to tell the pollsters their opinions?
- A. Students will not see the signs.
 - B. Self-selected responders are not a random sample.
 - C. There may be too many students whose last names start with A to L.
 - D. Students may not tell the truth.
- 8** Which of the following would be the best sample for this poll?
- A. All students in the school
 - B. Every fifth student on the honor roll
 - C. A randomly selected group of students in her grade
 - D. Students being dropped off by their parents at school

- 9** Suppose 49 out of 100 students in a fair sample support the candidate. Which is the best conclusion?
- A. The race is close.
 - B. The candidate will lose.
 - C. The candidate will win.
 - D. Polling is not useful in school elections.

Short-Response: Show your work for each question.

- 10** In a sample of voters in Clarksborough, 12 out of 25 favored building a new strip mall. If 25,000 people vote in the next Clarksborough election, how many are likely to vote in favor of the new strip mall based on this sample?
- 11** What is wrong with having an audience pick the best dancer in a talent show?
- 12** What would be a good sample to use to see what the favorite lunch is in the school cafeteria?

Extended-Response: Show your work for each question.

- 13** Belinda is conducting a poll to see what types of music are the most popular at her school. She asks all of her friends what kind of music they like, and reports the results. Explain why her survey may not be reliable, and how she could conduct a more reliable survey.

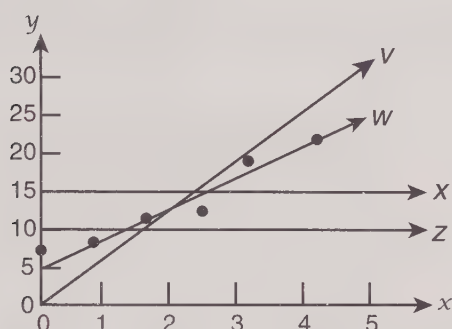
DATA ANALYSIS, STATISTICS, AND PROBABILITY

Scatterplots and Lines of Best Fit

8.D.2 Select, create, interpret, and utilize various tabular and graphical representations of data, e.g., circle graphs, Venn diagrams, scatterplots, stem-and-leaf plots, box-and-whisker plots, histograms, tables, and charts. Differentiate between continuous and discrete data and ways to represent them.

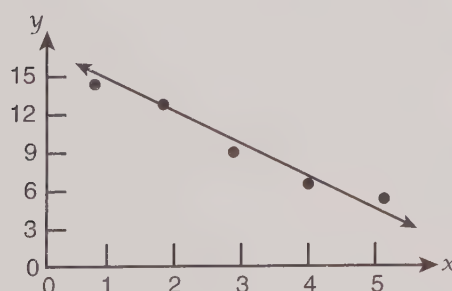
Select the best answer for each question.

- 1 Which line appears to be the line of best fit for the data shown?



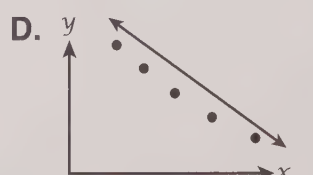
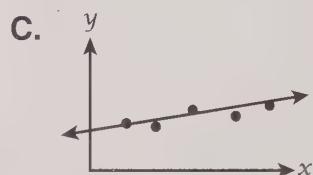
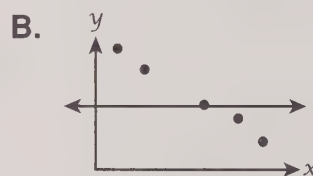
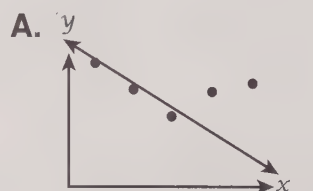
- A. line v
B. line w
C. line x
D. line z

- 2 Given the trend shown in the scatterplot below, which is the best estimate of the y-coordinate of the data point (6, y)?



- A. 4
B. 8
C. 13
D. 35

- 3 Which diagram shows a line of best fit?



- 4 The table below shows a set of data. Which of the following is true about the line of best fit?

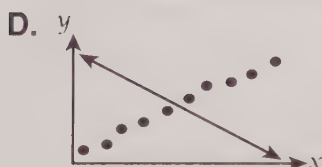
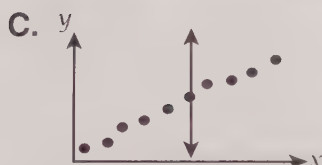
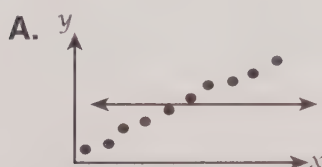
x	1	2	3	4	5
y	20	21	23	26	28

- A. It rises from left to right.
B. It falls from left to right.
C. The line is horizontal.
D. It rises, then falls from left to right.

- 5 Tamara noticed that as days passed in the fall, the number of hours of daylight decreased. Which is true about the line of best fit for the data shown in a scatterplot?

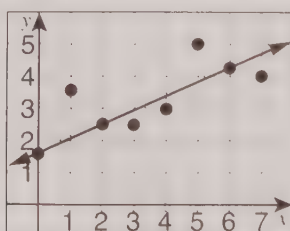
A. It rises from left to right.
 B. It falls from left to right.
 C. The line is horizontal.
 D. It rises, then falls from left to right.

- 6 Which diagram shows a line of best fit?



Short-Response: Show your work for each question.

- 7 What is the greatest vertical distance between the line of best fit and the points representing the data pairs in a data set?



- 8 The table below shows a set of data. Make a reasonable estimate of the value of y when $x = 12$. Explain your answer.

x	2	4	6	8	10
y	41	37	32	28	23

Extended-Response: Show your work for each question.

- 9 Edgar's mother measured Edgar's height every 6 months for 5 years. The table below shows the measurements.

Date	Height (in inches)
1/00	41
6/00	42
1/01	44
6/01	46
1/02	47
6/02	50
1/03	52
6/03	53
1/04	57
6/04	61

Plot these points and draw a line of best fit. Based on the line of best fit, how much did Edgar grow on average every 6 months? Assuming Edgar continues to grow taller, how much might he expect to grow in the next 6 months?

DATA ANALYSIS, STATISTICS, AND PROBABILITY**Experimental Probability**

8.D.4 Use tree diagrams, tables, organized lists, basic combinatorics (“fundamental counting principle”), and area models to compute probabilities for simple compound events, e.g., multiple coin tosses or rolls of dice.

Select the best answer for each question.

Use the table to answer questions 1–2. Joseph collected data on the kind of fruit students buy at lunch. The table shows the results.

Type of Fruit	Number of Students
Plum	8
Peach	4
Orange	11
Apple	16
Banana	9

- 1 Based on the experimental probability, which statement is a reasonable conclusion?
- A. The next student will most likely buy an apple.
 - B. The next student will most likely buy a pear.
 - C. The next student will most likely buy a plum.
 - D. The next student will most likely buy a banana.
- 2 Based on the experimental probability, which statement is a reasonable conclusion?
- A. It is unlikely that the next student will buy an apple.
 - B. It is probable that the next student will buy a peach.
 - C. It is unlikely that the next student will buy a peach.
 - D. It is equally likely that the next student will buy a banana or an apple.

Use the information below to answer questions 3–4.

Amar conducted an experiment with 2 coins. He tossed both coins 20 times and recorded the results. The table below shows his results.

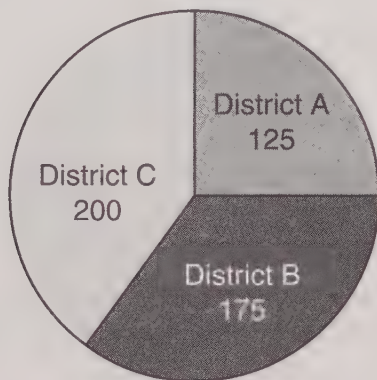
2 head	7
2 tails	4
1 head and 1 tails	9

- 3 Which of these statements is true?
- A. The experimental probability for 2 heads landing up is greater than the theoretical probability.
 - B. The experimental probability for 2 heads landing up is less than the theoretical probability.
 - C. The experimental probability for 2 heads landing up is equal to the theoretical probability.
 - D. The theoretical probability for 2 heads landing up is greater than the experimental probability.
- 4 Which statement could Amar make that is consistent with both his experimental results and with the theoretical probability?
- A. The most likely result is 1 heads and 1 tails.
 - B. The outcome of 2 heads is more likely than 2 tails.
 - C. The outcome of 2 tails has a probability of 20%.
 - D. The outcomes of 2 heads and 2 tails are equally likely.

- 5 A quality inspector inspects 5000 purses and finds 4700 to have no defects. What is the experimental probability that a purse will have defects?

A. 0.94 C. 0.16
B. 0.78 D. 0.06

The following graph shows the number of students with brown eyes, green eyes, and blue eyes in Mr. Williams' class. Use the graph to answer questions 6–7.



- 6 Shelly is in Mr. Williams' class. What is the probability that she has green eyes?
- A. 4% C. 32%
B. 16% D. 52%
- 7 What is the probability that a student in Mr. Williams' class has either blue or brown eyes?
- A. 13 out of 8
B. 8 out of 13
C. 13 out of 25
D. 21 out of 25

Short-Response: Show your work for each question.

- 8 Suppose Tria performs an experiment in which she tosses two coins. She repeats the experiment 12 times. The table shows her results.

Outcome	Frequency
2 tails	4
2 heads	2
1 head, 1 tail	6

For which outcome does the experimental probability match the theoretical probability? Explain.

Extended-Response: Show your work for each question.

Use the information to answer questions 9 and 10. A bag contains 11 blue tiles and 50 yellow tiles. Ronaldo does an experiment by picking one tile out of the bag without looking, recording its color, and then putting the tile back into the bag.

- 9 Ronaldo repeats the experiment 40 times. He draws a blue tile 18 times and a yellow tile 22 times. Compare the experimental results with the theoretical probability.
- 10 Suppose Ronaldo continues to repeat the experiment. Predict the relationship between the theoretical and experimental probabilities as the number of trials increases

DATA ANALYSIS, STATISTICS, AND PROBABILITY**Odds**

8.D.4 Use tree diagrams, tables, organized lists, basic combinatorics (“fundamental counting principle”), and area models to compute probabilities for simple compound events, e.g., multiple coin tosses or rolls of dice.

Select the best answer for each question.

- 1** If the probability of winning the school raffle is 0.02, what are the odds of winning?
- A. 2 to 100
B. 1 to 49
C. 1 to 2
D. 2 to 5
- 2** Consider a population of 100 people, 40 of which carry a gene for a certain trait. What are the odds of a person selected at random carrying the gene?
- A. 2 to 3
B. 4 to 10
C. 2 to 5
D. 3 to 5
- 3** If p is the proportion of people who have a trait, then which expression represents the odds of having the trait?
- A. $\frac{1}{p}$
B. $\frac{1-p}{p}$
C. $1-p$ to 1
D. $\frac{p}{1-p}$ to 1
- 4** Before Congress enacted the Do Not Call bill, the probability of a family receiving a call from a telemarketer during dinner was 60%. What were the odds of a family NOT receiving a call from a telemarketer during dinner?
- A. 1 to 6
B. 6 to 1
C. 3 to 5
D. 2 to 5
- 5** If we read that Tiger Woods enters a golf tournament with 9 to 5 odds for winning, what does that mean?
- A. It is more likely Tiger will win.
B. It is more likely Tiger will NOT win.
C. The probability of Tiger winning is 18%.
D. The probability of Tiger winning is 40%.
- 6** If we read that Tiger Woods enters a golf tournament with 9 to 5 odds against winning, what is the probability of Tiger winning?
- A. 0.36
B. 0.4
C. 0.6
D. 0.95

Use the following information to answer questions 7–8.

Sylvia has 20 marbles in a jar, 15 red and 5 blue. The probability of randomly drawing a blue marble is $\frac{1}{4}$. Sylvia draws a marble from the jar without looking.

- 7 What are the odds in favor of her drawing a blue marble?
- A. 1 to 4
 - B. 2 to 3
 - C. 1 to 3
 - D. 3 to 4
- 8 What are the odds against her drawing a blue marble?
- A. 4 to 1
 - B. 3 to 2
 - C. 4 to 3
 - D. 3 to 1
- 9 The odds against a horse winning a race are 4 to 1. What is the probability the horse will win the race?
- A. 20%
 - B. 30%
 - C. 40%
 - D. 80%
- 10 What are the odds in favor of getting heads on a coin flip?
- A. 2 to 1
 - B. 1 to 2
 - C. 1 to 1
 - D. 0.5

Short-Response: Show your work for each question.

- 11 Jonas has a number cube numbered 1 to 6. If Jonas tosses the cube, what are the odds of tossing a 4?
- 12 If the probability of an event is 75%, what are the odds in favor of the event happening?
- 13 If the probability of winning a contest is 1%, what are the odds against winning?

Extended-Response: Show your work for each question.

- 14 If the probability of an event is $\frac{a}{b}$, explain how to find the odds in favor and the odds against the event.
- 15 Joshua and 3 friends are starting a game. To decide who plays first, each person will draw a card from a deck of 52 playing cards. The person who draws the highest card will go first. The order of cards from highest to lowest are ace, king, queen, jack, 10, to 2. Joshua is the last person to draw. His three friends have drawn a jack, a 10, and a 4. What are the odds in favor of Joshua drawing a higher card? Explain.

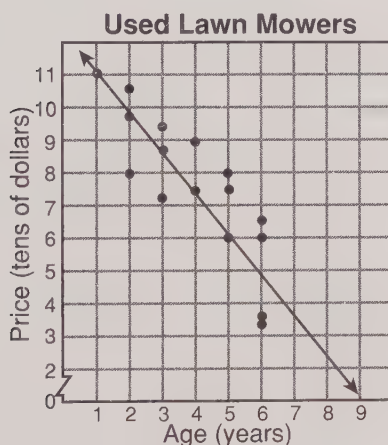
SAMPLE TEST A

Select the best answer for each question.

- 1 When the point (5, 1) is translated 4 units to the right and 3 units down, what are the new coordinates?

A. (1, -2) C. (9, -1)
B. (5, -2) D. (9, -2)

- 2 The scatter plot below shows the amount of money Ernie received from selling 16 used lawnmowers. He drew a line of best fit to determine how much he should expect to receive when he sells a mower. Which is the best estimate of how much he should receive when selling a 7-year-old mower?



- A. between \$30 and \$50
B. at least \$50
C. less than \$30
D. between \$2 and \$5

- 3 Which is the product of

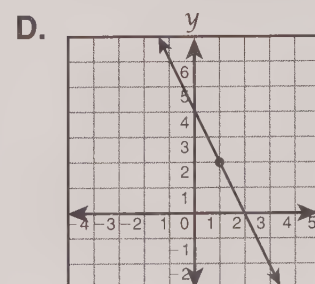
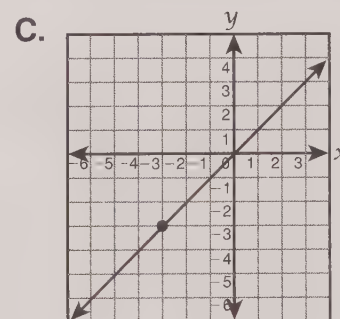
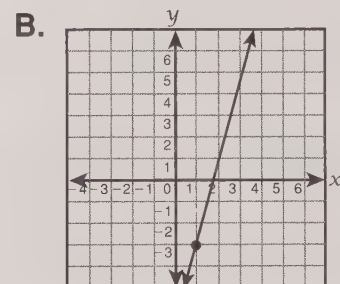
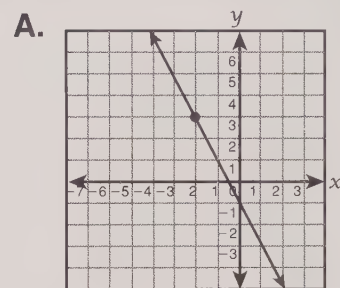
$$-5x^2(3 - 2x^3)?$$

- A. $-17x^5$ C. $-15x^2 + 10x^6$
B. $-15x^2 + 10x^5$ D. $-15x^2 - 10x^5$

- 4 The pilot of Amy's flight to California said that the plane was cruising at 460 mi/hr. At this speed, how long would it take the plane to fly a distance of 1,702 miles?

- A. 4.2 hours C. 3.85 hours
B. 3.9 hours D. 3.7 hours

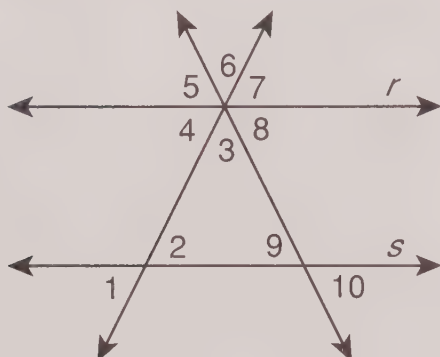
- 5 Which is the graph of $y = -2x + 4$?



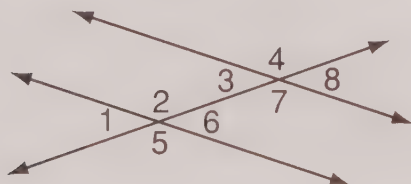
- 6 Which value is closest to the actual value of π ?

A. $3\frac{1}{4}$
 B. $\frac{22}{7}$
 C. 3.54
 D. $\frac{31}{4}$

- 7 In the figure below, line r is parallel to line s . Which are a pair of alternate exterior angles?



- A. $\angle 1$ and $\angle 2$
 B. $\angle 1$ and $\angle 6$
 C. $\angle 1$ and $\angle 7$
 D. $\angle 2$ and $\angle 7$
- 8 Two of these lines are parallel. Which are a pair of corresponding angles?



- A. $\angle 1$ and $\angle 2$
 B. $\angle 1$ and $\angle 3$
 C. $\angle 1$ and $\angle 5$
 D. $\angle 1$ and $\angle 6$

- 9 Which shows a base plan for the 3-D object shown?



- A.

4	3	3
2	1	2
- B.

4	3	3
3	3	3
- C.

1	3	2
3	1	2
- D.

4	3	4
2	1	2

- 10 Which is a true statement?

- A. The sum of two odd integers is also odd.
 B. The product of an even integer and an odd integer is an odd integer.
 C. The product of two even integers is also even.
 D. The sum of two even integers is an odd integer.

- 11 Which best describes the product of $\frac{3}{10} \times \left(-\frac{4}{5}\right)$?

- A. less than $-\frac{4}{5}$
 B. greater than $\frac{3}{10}$ but less than 1
 C. between $-\frac{4}{5}$ and $\frac{3}{10}$
 D. greater than 1

- 12 What is $8 - 9 + (-5) + (-8) + 9 + 5$?

A. 0
B. 1
C. 26
D. 44

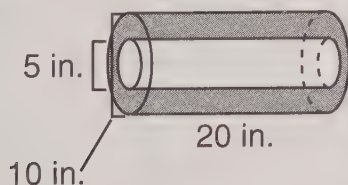
- 13 A 9-lb package of hamburger costs \$19.71. A sticker on the package reads, "You save 35¢ per pound." What was the original price per pound?

A. \$2.54
B. \$2.23
C. \$2.19
D. \$1.84

- 14 Between which two whole numbers would you find $\sqrt[3]{200}$?

A. 66 and 67
B. 14 and 15
C. 5 and 6
D. 4 and 5

- 15 What is the volume of the shaded region in the figure? Use 3.14 for π .



A. 314 in.^3
B. $4,710 \text{ in.}^3$
C. $1,256 \text{ in.}^3$
D. $1,177.5 \text{ in.}^3$

- 16 Mr. Harold put 90 liters of gas in his car's fuel tank. About how many gallons of gas did he buy? Use $1 \text{ gallon} \approx 4.4 \text{ liters}$.

A. 396 gallons
B. 94.4 gallons
C. 22.5 gallons
D. 20.45 gallons

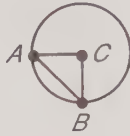
- 17 To change kilograms to long tons you multiply the number of kilograms by 9×10^{-4} . What is 9×10^{-4} written in standard form?

A. 0.10009
B. 0.009
C. 0.0009
D. 9,0000

- 18 Set A is a set of numbers each greater than 10. Set B consists of the numbers in set A each decreased by 4. Which of the following is always true?

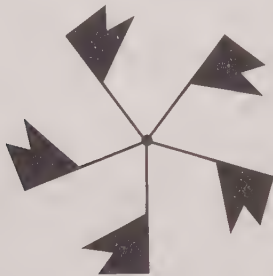
A. Sets A and B have the same range.
B. The range of set A is 14 more than the range of set B.
C. The range of set A is 4 less than the range of set B.
D. The range of set A is 4 times the range of set B.

- 19 How is the hypotenuse of $\triangle ABC$ related to circle C ?



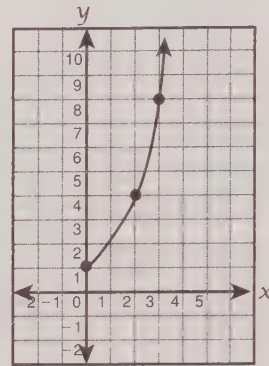
- A. It is tangent to the circle.
- B. It is the diameter of the circle.
- C. It is a radius of the circle.
- D. It is a chord of the circle.

- 20 What type of symmetry does this design have?



- A. rotational symmetry
 - B. line symmetry
 - C. plane symmetry
 - D. no symmetry
- 21 Bethany waited in line 42 minutes to ride a roller coaster. Which decimal shows the part of an hour she waited?
- A. 0.07
 - B. 0.7
 - C. 1.43
 - D. 0.42

- 22 Gordon made the following graph to show the positive values of x and the corresponding values of y for $y = 2^x$. Which is the best interpolated value of $2^{2.5}$?



- A. about 4.5
 - B. about 5.5
 - C. about 6.5
 - D. about 7.5
- 23 The chart shows the balance in Neil's savings account and the change from the previous month.

For which month did the account have the greatest change?

Month	Balance	Change
February	\$782.40	_____
March	\$796.50	+\$13.10
April	\$1,076.34	+\$279.84
May	\$731.29	-\$345.05
June	\$895.08	+\$163.79

- A. March
- B. April
- C. May
- D. June

- 24 Which best describes the result of subtracting a negative odd integer from a positive even integer?

A. negative even integer
B. negative odd integer
C. positive even integer
D. positive odd integer

- 25 Three integers have a sum of 33. The second integer is 3 more than the first integer. The third integer is eight less than twice the second integer. What are the three integers?

A. 6, 9, 10 C. 9, 12, 21
B. 8, 11, 14 D. 2, 13, 18

- 26 Some planets have masses less than the mass of Earth by the factors shown in the table.

Planet	Factor
Mercury	0.0553
Pluto	0.0021
Venus	0.8151
Earth	1.0

Which equation is true for p , the mass of Pluto, and e , the mass of Earth?

A. $p = 0.0553e$
B. $p = 0.0021e$
C. $p = e - 0.0021$
D. $e = 0.0021p$

- 27 Which is the value of the expression $(8 - 3)^2 \times 4 \div 2$?

A. 10 C. 50
B. 46 D. 242

- 28 When the stock market fell, Hayes lost 18% of the value of his stock. The stock was worth \$2,486.95 before the loss. What was the stock worth after the loss?

A. \$447.65
B. \$1,985.45
C. \$2,006.75
D. \$2,039.30

- 29 Bonnie and two friends plan to rent a professional-grade rug cleaner and split the cost evenly. The machine costs \$26.88 per day. If the three friends keep the machine for 5 days, how much will each pay?

A. \$26.88 C. \$44.80
B. \$34.40 D. \$134.40

- 30 The thickness of a piece of paper is measured in calipers, or thousandths of an inch. If the caliper of a piece of paper is 0.0048, about how many sheets of paper will it take to make a stack of paper 0.8 inches tall?

A. about 4 sheets
B. about 16 sheets
C. about 167 sheets
D. about 6,000 sheets

- 31 Which of the following statements is true?

A. 0.23 is between $\frac{1}{10}$ and $\frac{1}{5}$.
B. 0.23 is between $\frac{1}{10}$ and $\frac{1}{8}$.
C. 0.23 is between $\frac{1}{8}$ and $\frac{1}{4}$.
D. 0.23 is between $\frac{1}{4}$ and $\frac{1}{3}$.

- 32 What is the missing term in the input/output table?

x	$y = -6 + 23$
-4	47
-1	?
0	23
2	11

- A. 33 C. 24
B. 29 D. 17
- 33 Which equation models the relationship in the table if c represents the cost and n represents the number of pizzas?

c	7	14	21	28
n	1	2	3	4

- A. $c = 6n + 1$ C. $c = 7n$
B. $c = 10n - 3$ D. $c = 5n + 2$
- 34 Maggie drew a right triangle with one side 10 centimeters long. Which two side lengths are possible for the other sides of Maggie's triangle?
- A. 7.5 and 12.5 centimeters
B. 12.5 and 15 centimeters
C. 20 and 30 centimeters
D. 25 and 40 centimeters
- 35 On a number line, between which two whole numbers would $\sqrt{777}$ be located?
- A. 24 and 25 C. 26 and 27
B. 25 and 26 D. 27 and 28

- 36 About 129,600,000,000 gallons of water flow over Niagara Falls every day. Which shows that number written in scientific notation?

A. 12.96×10^{12} C. 1.296×10^{11}
B. 1.296×10^{10} D. 1.296×10^{12}

- 37 Which statement is true about $\sqrt{1,225}$?

A. It is equal to $\sqrt{25} \times \sqrt{49}$.
B. It is an irrational number.
C. It is equal to 38.
D. It is a repeating decimal.

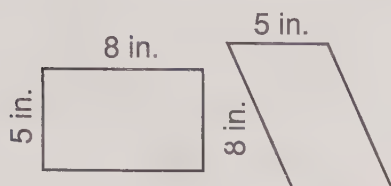
- 38 A company that manufactures squeaky toys for dogs expects that 1 of every 60 toys will have a defective squeaker. How many defective squeakers should it expect in a shipment of 75,945 squeaky toys? Round to the nearest whole number.

A. 1,264 C. 1,266
B. 1,265 D. 1,267

- 39 Kayla went over her allotted cell phone minutes this month by 42 minutes. Her regular bill is \$39.95, but this month it was \$54.65. Which ratio compares her overtime minutes to the cost of those minutes?

A. $\frac{\$39.95}{\$54.65}$
B. $\frac{42}{\$39.95}$
C. $\frac{42}{\$14.70}$
D. $\frac{42}{\$54.65}$

- 40 Which describes the relationship between these quadrilaterals?



- A. congruent and similar
 B. similar but not congruent
 C. congruent but not similar
 D. neither congruent nor similar
- 41 Beth is standing beside her house. She casts a shadow 12.5 feet long at the same time that the house casts a shadow 50 feet long. If Beth is 5 feet tall, how tall is her house?
- A. 2.5 feet
 B. 20 feet
 C. 25 feet
 D. 125 feet
- 42 According to the census, the population of St. Louis in 2000 was 348,189. The city covers an area of 61.37 square miles. What was the population density of St. Louis in 2000?
- A. about 6 people per square mile
 B. about 175 people per square mile
 C. about 6,000 people per square mile
 D. about 18,000,000 people per square mile

- 43 The distance between two cities is 120 miles. On a map, the distance between the cities is 9.6 centimeters. What is the scale of the map?

- A. 1 centimeter = 12 miles
 B. 1 centimeter = 25 miles
 C. 2 centimeters = 12 miles
 D. 2 centimeters = 25 miles

- 44 Antonio lives $3\frac{1}{2}$ miles from school. About how many kilometers does he live from school?
 Use 1 mile \approx 1.6 kilometers.

- A. about 2.2 kilometers
 B. about 3.5 kilometers
 C. about 5.1 kilometers
 D. about 5.6 kilometers

- 45 The isosceles triangles shown below are similar. What is the length of one of the missing sides of the triangle on the left?



- A. 9 ft
 B. $10\frac{1}{2}$ ft
 C. 11 ft
 D. $12\frac{1}{4}$ ft

- 46 Bert was a member of a chess team that won 148 of the 250 games it played during junior high school. Which is the percent of the games Bert's team lost?

A. 40.8% C. 59.2%
B. 46.9% D. 61.3%

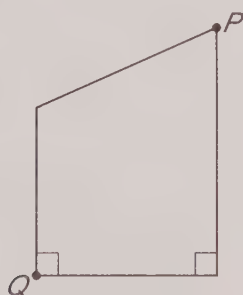
- 47 To the nearest whole number, which is 66.407% of 93,748?

A. 61,873
B. 62,255
C. 62,811
D. 63,186

- 48 What is the least number of congruent equilateral triangles needed to form a regular hexagon?

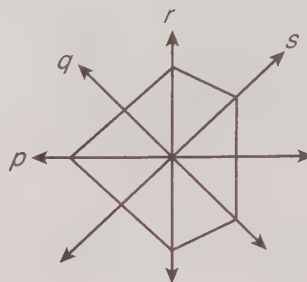
A. 3 C. 5
B. 4 D. 6

- 49 What do you get if you connect point P to point Q with a line segment?



- A. two right triangles
B. a triangle and a rectangle
C. an acute triangle and a right triangle
D. an obtuse triangle and a right triangle

- 50 Which line is a line of symmetry for this pentagon?



- A. line p
B. line q
C. line r
D. line s

- 51 What does this pentagon look like after it is reflected across a vertical line and then rotated $\frac{1}{4}$ turn counterclockwise?



- A. C.
B. D.

- 52** Oliver's bank charges a \$12 checking account fee per month plus a \$0.08 fee per check written. The equation below gives c , the total cost of the checking account for a month in which n checks are written.

$$c = 12 + 0.08n$$

How many checks did Oliver write during a month in which his total checking account cost was \$13.92?

- A. 8 C. 21
B. 18 D. 24

- 53** In Mr. Hammer's math class, students practiced geometry communication in pairs. Samantha gave the following description of a three-dimensional figure to her partner, Tai.

- The solid has 8 vertices.
- The solid has 6 faces.
- The solid has 12 edges.

Which of the following figures should Tai choose as the match to Samantha's description?

- A. tetrahedron
B. pentagonal prism
C. square pyramid
D. rectangular prism

- 54** In the year 2000, the estimated population of China was 1.27 billion people. Which of the following represents this number in scientific notation?

- A. 1.269×10^9
B. 1.269×10^8
C. 1.269×10^{-8}
D. 1.269×10^{-9}

- 55** The table shows the amount of certain juices remaining in the cafeteria juice dispenser.

Juice	Amount (in quarts)
Pineapple	$12\frac{1}{2}$
Orange	$6\frac{3}{4}$
Guava	$3\frac{3}{8}$

Which of the following statements is true?

- A. There remains twice as much pineapple juice as orange juice.
B. The difference between the amount of pineapple juice remaining and the amount of guava juice remaining is $9\frac{3}{8}$ quarts.
C. The total amount of juice remaining is 22 quarts.
D. There remains twice as much orange juice as guava juice.

- 56** The table below shows flight and layover times for Emanuel's trip from Dallas to New York.

Flight Leg	Time (in hours)
Dallas to Chicago	2
Layover in Chicago	$1\frac{5}{6}$
Chicago to New York	$2\frac{1}{2}$

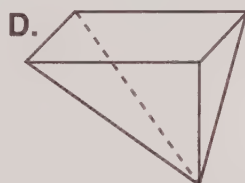
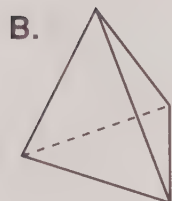
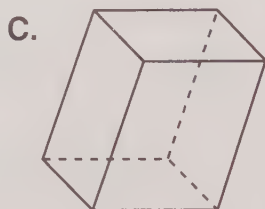
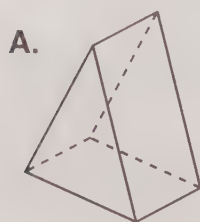
How much shorter was the layover than the flight leg from Dallas to Chicago?

- A. 6 minutes C. 12 minutes
B. 10 minutes D. 18 minutes

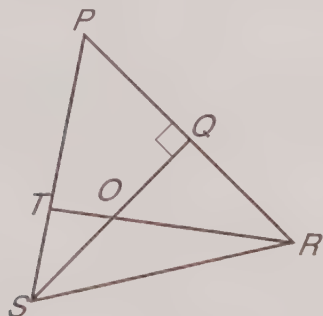
- 57 Lola is using a scale factor of $\frac{2}{10}$ to make a mural painting of a castle and its landscape. If she paints the castle 6 feet tall, what is the actual height of the castle?

A. 3.3 feet tall C. 260 feet tall
B. 120 feet tall D. 620 feet tall

- 58 Which solid has 6 faces?



- 59 If PQ measures 12 inches and PS measures $\sqrt{340}$ inches, what is the measure of SQ ?

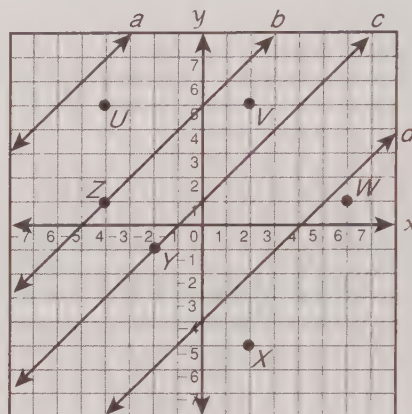


A. 12 inches
B. 13.5 inches
C. 14 inches
D. It cannot be determined.

- 60 What is the measure of each interior angle in a regular octagon?

A. 30°
B. 45°
C. 100°
D. 135°

Use this figure for questions 61–64.



- 61 Draw a line that passes through points X and Y . What is the slope of the line?

A. 2
B. 1
C. -1
D. -2

- 62 Draw a line that passes through points V and W . Where does this line intersect line c ?

A. (3, 4)
B. (3.5, 4.5)
C. (4, 4)
D. (2, 5)

- 63 What is the slope of the line made by connecting points U and V ?

A. 1
B. 0
C. -1
D. It cannot be determined.

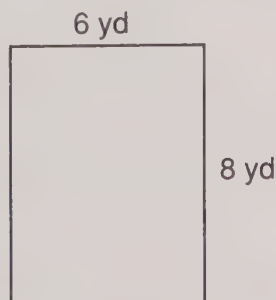
- 64 Which of the following ordered pairs represents a point in the third quadrant?

A. $(-6, 4)$
B. $(6, -4)$
C. $(-6, -4)$
D. $(0, -4)$

- 65 A piece of cardboard has an area of 7 square feet. What is its area in square inches?

A. 84 square inches
B. 1,008 square inches
C. 1,680 square inches
D. 8,400 square inches

- 66 How many square feet of carpet are needed to cover this living room floor?

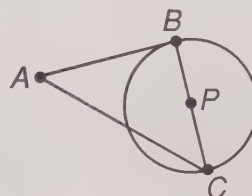


A. $5\frac{1}{3}$ square feet
B. 48 square feet
C. 144 square feet
D. 432 square feet

- 67 To protect his vegetable garden from a frost, Jarod plans to place a sheet over the rectangular garden that is 4.3 meters by 6.2 meters. How many square meters of fabric will he need?

A. 10.5 square meters
B. 20.22 square meters
C. 23.1 square meters
D. 26.66 square meters

- 68 How is segment AB related to the circle?



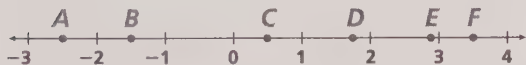
A. It is a radius of the circle.
B. It is a diameter of the circle.
C. It is an arc of the circle.
D. It is tangent to the circle.

- 69 Draw a line that passes through points V and W . Where does this line intersect line c ?

A. $(3, 4)$
B. $(3.5, 4.5)$
C. $(4, 4)$
D. $(2, 5)$

- 70 Which of the following events are independent?
- A. Two teams' chances of winning the Super Bowl.
 - B. The likelihood of two students having the same teacher
 - C. The probability of it snowing twice in a row
 - D. The chances of winning a medal at the Summer or Winter Olympics

- 71 What is the midpoint between points A and 4?



- 72 A rectangular prism is 4 inches \times 7 inches \times 8 inches. Another rectangular prism has dimensions that are 2 times as long. How much smaller is the volume of the second prism than the first prism?
- A. $\frac{1}{8}$ the size
 - B. $\frac{1}{4}$ the size
 - C. $\frac{1}{2}$ the size
 - D. 3 the size

- 73 If 2.86×10^{-4} is written in standard notation, how many zeros would be included to the right of the decimal point?

- A. 3
- B. 4
- C. 5
- D. 6

- 74 Greg walks at a constant speed of 3.5 miles per hour. Which equation would you use to find the number of hours, t , Greg walked if he traveled 21 miles?

A. $21 = 3.5t$

B. $21 = \frac{t}{3.5}$

C. $3.5 = \frac{t}{21}$

D. $3.5t = \frac{t}{21}$

- 75 A 1 pound 12 ounce jar of peanut butter costs \$3.79. Randi used 18 ounces of the peanut butter to make cookies. What was the cost of the peanut butter Randi used, rounded to the nearest whole cent?

- A. \$1.90
- B. \$5.69
- C. \$2.44
- D. \$1.44

- 76 Complete the table for $f(x) = 3x - 2$.

x	y
0	
2	
4	

- A. -2, 4, 10
B. -2, 4, 24
C. 0, 4, 24
D. 0, 8, 10

- 77 To win a prize in a board game, you must spend more than \$19 on banners. Each banner costs \$3. Which inequality would you use to find the number of banners you must buy to win a prize?

- A. $19 < 3n$
B. $19 \leq 3n$
C. $19 \geq 3n$
D. $19 > 3n$

- 78 How would you describe the slope of the line described by the following function?

$$y = \left(-\frac{5}{3}\right)x + \frac{5}{3}$$

- A. The slope is positive.
B. The slope is negative.
C. The slope is 0.
D. The slope is undefined.

- 79 Evaluate $14^2 - 15$.

- A. 16
B. 78
C. 142
D. 181

- 80 Ray did several odd jobs this week and donated $\frac{1}{5}$ of the money he earned to a local food bank and $\frac{1}{4}$ of the money he earned to a homeless shelter. If Ray donated a total of \$27.00 to the two organizations, how much did he earn this week doing odd jobs?

- A. \$27.00
B. \$60.00
C. \$133.25
D. \$243.00

- 81 Which of the following is a function?

A.

Input	-7	-3	2	8
Output	7	3	-2	-8

B.

Input	3	3	3	3
Output	0	1	2	3

C.

Input	7	12	8	8
Output	-1	0	-1	1

D.

Input	1	2	3	2
Output	0	1	0	-1

- 82 Which is the greatest number?

- A. 5.56×10^{-23}
B. 2.78×10^{12}
C. 4.72×10^9
D. 2.74×10^{-18}

- 83 Stan drew a right triangle with sides 9 inches, 12 inches, and 15 inches long. Terry drew a similar triangle to Stan's. Which of the following can be the measurements of Terry's triangle?

A. 3 inches, 4 inches, and 5 inches
B. 5 inches, 7 inches, and 3 inches
C. 7 inches, 7 inches, and 10 inches
D. 9 inches, 12 inches, and 13 inches

- 84 A set of numbers Y is $\{1, 4, 8, 10, 18, 21, 22, 30, x\}$. If you know the median of the data is 10, what is the best statement about x ?

A. x is strictly greater than 10
B. x is greater than or equal to 10
C. x is strictly less than 10.
D. x is less than or equal to 10.

Short-Response: Show your work for each question.

- 85 Draw the reflection of the triangle over a vertical line.



- 86 What is the total of the probabilities of all the events in a sample space?
- 87 Suppose 0.25 of the colored chocolate candies in a bowl are red. You take a random handful of candies and find that 6 are red. About how many candies are in the handful?

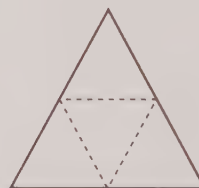
- 88 At what point does the graph of the line $y = 2x - 3$ cross the y -axis?

- 89 What is the slope of the line $y = -x - 4$?

- 90 Find the distance between these two points in space.

$(4, 5, 1)$ and $(1, 1, 1)$

- 91 The two-dimensional net below can be folded into what three-dimensional figure?



- 92 What are the odds in favor of flipping heads on one fair toss of a coin?

- 93 The sun is 93 million miles from the Earth. Write this number in scientific notation.

- 94 Is $\sqrt{8}$ a rational or irrational number?

Extended-Response: Show your work for each question.

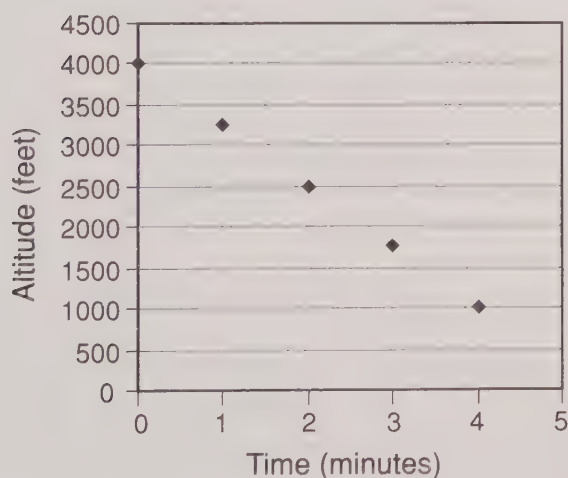
- 95 Two shoes are drawn together from a box containing 20 pairs. What is the probability of getting one left shoe and one right? Explain.

- 96** Marcus rolls a six-sided cube 30 times. He keeps track of the results of the rolls in the table below.

Roll Outcome	Frequency
1	3
2	5
3	4
4	6
5	7
6	5

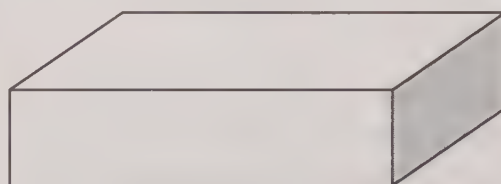
For which outcomes are the experimental probabilities greater than the theoretical probabilities? Explain your answer.

- 97** The graph below shows the altitude in feet of a given aircraft from the time it begins its landing approach. What is the slope of the line that connects the points on the graph? Explain your answer.



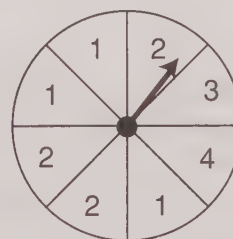
- 98** Compare the volume of a cylinder with a radius of 5 inches and a height of 14 inches to that of a cylinder with a radius of 14 inches and a height of 5 inches.

- 99** A gift box in the shape of a rectangular prism is 1 foot long, 12 inches wide, and 3 inches deep. To gift-wrap the box, Danielle estimates she will need about 15% extra wrapping paper to allow for overlap and waste. About how much paper will she need?



- 100** Explain how to find the volume of a cube whose diagonal has a length of 2 meters.

- 101** The spinner below is spun 3 times in a row. What is the probability of spinning a 1 three times in a row.



- 102** What is the 40th figure in this pattern?
Explain your reasoning.



- 103** Mr. Baldrige finds that the supply and demand for gasoline at his station are generally given by the following equations where x is the supply in gallons and y is the demand in gallons.

$$x - y = -2$$

$$x + y = 10$$

Solve the system of equations to find the equilibrium point where the supply and demand lines intersect. Show your work.

- 104** Draw a bar graph to represent the information in the table below.

Class	Art	Biology	Choir	Spanish
Number of Students	20	15	20	25

- 105** Two number cubes are rolled at the same time. Write out the sample space for this experiment, and explain how to use it to find the probability of rolling a total of 7.

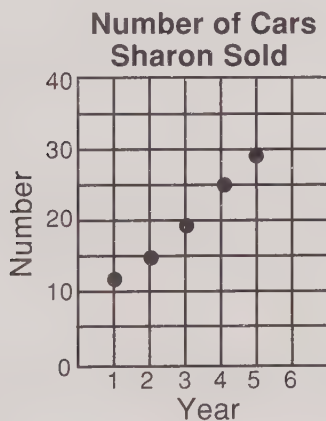
SAMPLE TEST B

Select the best answer for each question.

- 1 When the point $(4, -2)$ is translated 2 units to the left and 4 units down, what are the new coordinates?

A. $(2, -4)$ C. $(-2, 4)$
B. $(6, 2)$ D. $(2, -6)$

- 2 The scatterplot below shows the number of cars Sharon sold during each of the five years she worked as a car dealer. She draws a line of best fit to determine how many cars she should expect to sell during her sixth year. Which is the best estimate of how many cars Sharon will sell in her sixth year?



A. at least 35
B. less than 30
C. between 25 and 30
D. between 30 and 35

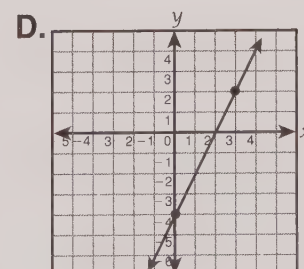
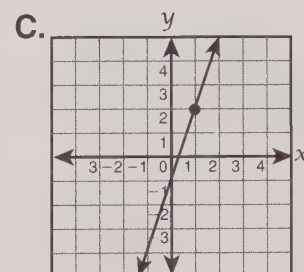
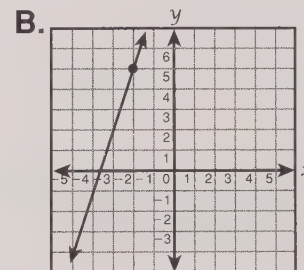
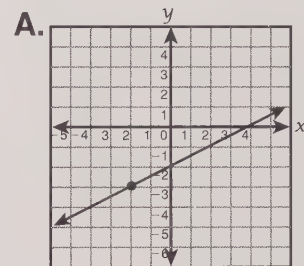
- 3 Which is the product of $3x^2(-3x^2 + 7)$?

A. $2x^4$ C. $-9x^4 + 21x^2$
B. $-9x^2 + 21$ D. $-6x^2 + 7$

- 4 The engineer of Dom's train said that the train was cruising at a speed of 186 mi/hr. At this speed, how long would it take the train to travel a distance of 1,041.6 miles?

A. 56 hours
B. 5.6 hours
C. 4.5 hours
D. 1.79 hours

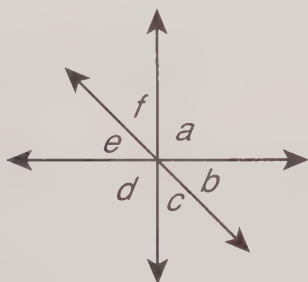
- 5 Which is the graph of $y = 3x - 1$?



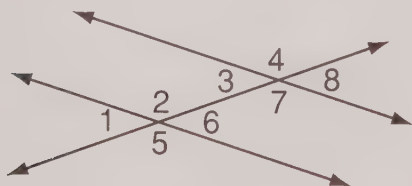
- 6 Which estimate for $\sqrt{2}$ is closest to the actual value of $\sqrt{2}$?

A. $1\frac{1}{2}$
 B. $\frac{1}{2}$
 C. 1.4142
 D. 3.14159

- 7 Which pair of angles are vertical angles?

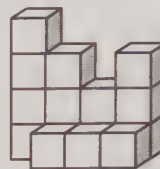


- 8 Two of these lines are parallel. Which are a pair of adjacent angles?



A. $\angle 1$ and $\angle 8$
 B. $\angle 1$ and $\angle 3$
 C. $\angle 1$ and $\angle 5$
 D. $\angle 1$ and $\angle 6$

- 9 Which shows a base plan for the 3-D object shown?



A.

4	2	1	3
1	1	1	

 B.

4	3	2	3
1	1	1	

 C.

4	3	1	3
	3		

 D.

4	2	2	3
1	1	1	

- 10 Which is a true statement?

A. The difference of two odd integers is also odd.
 B. The product of two odd integers is an odd integer.
 C. The product of two even integers is an odd integer.
 D. The sum of two odd integers is an odd integer.

- 11 Which best describes the product of $\frac{7}{10} \times 0$?

A. 0
 B. greater than $\frac{7}{10}$ but less than 1
 C. less than 0
 D. greater than 1

- 12 What is $-12 + 11 + 6(-5 + 5) + 5 \div 5$?

A. -3
 B. -4.4
 C. -1
 D. 0

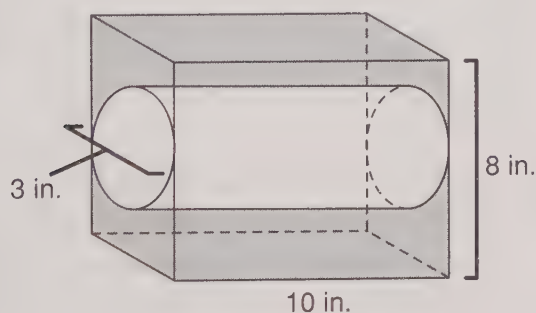
- 13** A 5-lb package of sausage costs \$16.45. A sticker on the package reads, "You save 25¢ per pound." What was the original price per pound?

A. \$3.04 C. \$3.29
B. \$3.24 D. \$3.54

- 14** Between which two whole numbers would you find $\sqrt[3]{500}$?

A. 10 and 50
B. 16 and 31
C. 8 and 9
D. 7 and 8

- 15** What is the volume of the shaded region in the figure? Use 3.14 for π .



A. 42.6 in^3 C. 173.8 in^3
B. 169.35 in^3 D. 197.5 in^3

- 16** One mile is about 1.6 kilometers. Devin lives $1\frac{2}{3}$ miles from his grandmother. About how many kilometers does he live from his grandmother?

A. about 2.7 kilometers
B. about 3.3 kilometers
C. about 3.7 kilometers
D. about 1.96 kilometers

- 17** To change gallons to cubic meters you multiply the number of gallons by 0.0038. What is 0.0038 written in scientific notation?

A. 3.8×10^{-4}
B. 3.8×10^4
C. 3.8×10^{-3}
D. 38×10^{-4}

- 18** Set A is a set of numbers each between 1 and 10. Set B consists of the numbers in set A each multiplied by 2. Which of the following is always true?

A. Sets A and B have the same mean.
B. The mean of set A is 2 times the mean of set B .
C. The mean of set B is twice the mean of set A .
D. The mean of set A is one-fourth the mean of set B .

- 19** Which figure can be formed when you join sides of the three equilateral triangles?



A. parallelogram C. square
B. trapezoid D. triangle

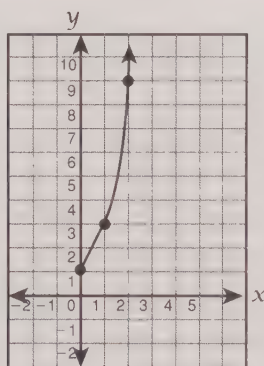
- 20** What type of symmetry does a cube have?

A. line symmetry
B. point symmetry
C. plane symmetry
D. both line and point symmetry

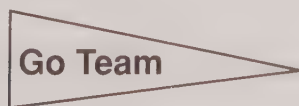
- 21 Josephina worked on her homework for 72 minutes. What percent of an hour did she work on her homework?

A. 12%
B. 20%
C. 83%
D. 120%

- 22 Gordon made the following graph to show the positive values of x and the corresponding values of y for $y = 3^x$. Which is the best interpolated value of $3^{1.75}$?

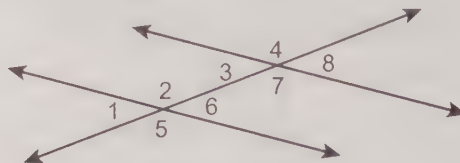


- A. about 3.75
B. about 5
C. about 6.8
D. about 7.8
- 23 Harrison is making a banner in the shape of an isosceles triangle. If each base angle measures 80° , what is the measure of the third angle?

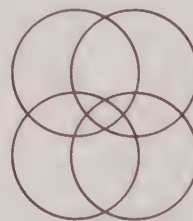


A. 20°
B. 80°
C. 120°
D. 160°

- 24 The two lines that do not intersect are parallel. If $m\angle 1 = 40^\circ$, what is $m\angle 5$?

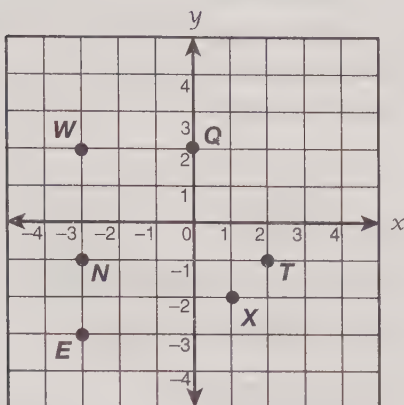


- A. 40°
B. 50°
C. 130°
D. 140°
- 25 A line segment has endpoints at $(-5, 0)$ and $(0, 6)$. What are the coordinates of the midpoint of this line segment?
- A. $(-2, 3)$
B. $(-2.5, 3)$
C. $(-2.5, 3.5)$
D. $(-3.5, 3.5)$
- 26 How many regions are formed by these four intersecting circles? Do not include the region that is exterior to all four circles.

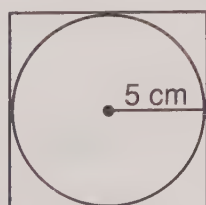


A. 10
B. 13
C. 16
D. 24

- 27 Which four points are the vertices of a trapezoid?



- A. Points N, Q, T, E
 B. Points N, E, X, T
 C. Points W, N, X, T
 D. Points W, Q, T, N
- 28 The area of a square deck is 225 ft^2 . What is the length of one side of the deck?
- A. 14 feet C. 25 feet
 B. 15 feet D. 28 feet
- 29 A circle with a radius of 5 centimeters is inscribed in a square. If the circle is cut out, what is the area of the square that remains? Use 3.14 for π .



- A. 21.5 square centimeters
 B. 68.6 square centimeters
 C. 84.3 square centimeters
 D. 100 square centimeters

- 30 What is the area of a label that goes completely around a can with a diameter of 3 inches and a height of 6.5 inches? Use 3.14 for π .

- A. 45.9 square inches
 B. 61.23 square inches
 C. 75.33 square inches
 D. 122.4 square inches

- 31 Which figure has seven faces?

- A. pentagonal prism
 B. hexagonal prism
 C. prism with seven-sided base
 D. pyramid with seven-sided base

- 32 Cabrini is drawing an obtuse isosceles triangle. The longest side will be 20 inches long. What will be the height of the triangle if the area of the triangle is 85 square inches?

- A. 4.25 inches
 B. 8.5 inches
 C. 10 inches
 D. 65 inches

- 33 Which shape always has exactly one square face?

- A. cube
 B. square pyramid
 C. rectangular prism
 D. triangular prism

- 34** The numbers below are the lengths in minutes of ten telephone calls Zelda made on her cell phone. Assuming she spends about the same time on each call, which time in minutes could be the length of her next call?

2.1, 3.1, 3.4, 3.2, 5.0,
4.3, 4.2, 4.1, 3.9, 3.8

- A. 0.4
- B. 0.9
- C. 3.5
- D. 19.4

- 35** The table shows a sampling of wages, in dollars per hour. By how much does the greatest wage exceed the mean wage?

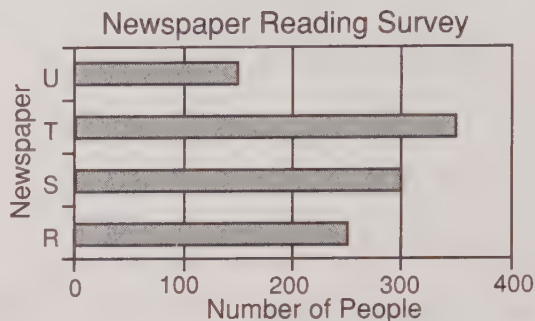
\$12.50	\$11.80	\$11.50	\$11.10
\$10.90	\$10.80	\$11.80	\$10.20
\$11.75	\$12.15	\$15.10	\$20.40

- A. \$7.10
- B. \$7.90
- C. \$8.10
- D. \$12.50

- 36** Which set of data values has the greatest mean but the smallest median?

- A. 1, 29, 30, 31, 29
- B. 2, 3, 4, 98, 97
- C. 38, 38, 38, 38, 38
- D. 10, 20, 30, 40, 50

- 37** One thousand people who read newspapers were asked which paper they read weekly. The bar graph shows the results. Which best explains why the sum of the heights of the bars is greater than 1,000?



- A. The number of people surveyed is greater than 1,000.
- B. Some newspapers are owned by the same newspaper company.
- C. People were asked to choose only one newspaper from those they read.
- D. Some people read more than one newspaper.

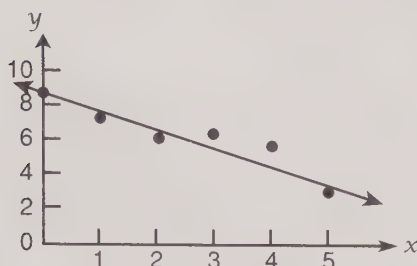
- 38** By how much does the median of Set Y exceed the median of set X?

Set X: 10, 8, 11, 9, 13

Set Y: 15, 12, 8, 9, 12

- A. 2
- B. 3
- C. 10
- D. 12

- 39 Given the trend shown in the scatterplot below, which is the best estimate of the y -coordinate of the data point $(6, y)$?



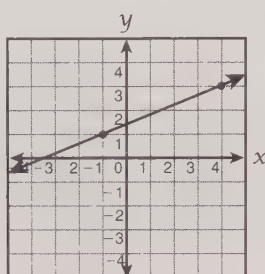
- A. 2
B. 6
C. 9
D. 10
- 40 Which group would be the best random sample of all people living in a certain town?
- A. Every 50th name on an alphabetical list of town residents.
B. Every person in the town's library at 4:45 on a Saturday afternoon.
C. Every person whose last name begins with the letter K.
D. The parents of all eighth-grade students.
- 41 The sample space for a particular spinner is $\{S, T, P, Q, R\}$. If all outcomes are equally likely, which of the following has a probability of 40%?
- A. Spinning an S.
B. Spinning an S and a T.
C. Spinning an S or a T.
D. Spinning an S, a T, and a P.

- 42 A spinner is divided into five equal sections, numbered 1, 2, 3, 4, and 5. Which of the following statements is false?
- A. The chance of spinning a 2 is the same as for spinning a 3.
B. All the outcomes are equally likely.
C. The chance of spinning a 4 is twice the chance of spinning a 1.
D. The chance of spinning either a 2 or a 3 is the same as the chance of spinning a 4.
- 43 Two gloves are drawn together from a bag containing 100 pairs. What is the probability of getting one left glove and one right glove?
- A. $\frac{50}{199}$ C. $\frac{1}{2}$
B. $\frac{50}{99}$ D. $\frac{3}{4}$
- 44 Ruby has 4 red hats and 6 blue hats. If she picks one at random, what is the probability she will get a blue hat?
- A. 20% C. 50%
B. 40% D. 60%
- 45 What is the solution to the following inequality?
- $$\frac{(2x)}{5} \leq -4?$$
- A. $x \leq -10$ C. $x \geq -10$
B. $x \leq -\left(\frac{2}{5}\right)$ D. $x \geq -\left(\frac{2}{5}\right)$

- 46 Which shows $-5r - 3s + 2t + (-6s) - 5t + 2r$ simplified?

A. $-9r - + 3s - 3t$
 B. $-3r - 9s - 3t$
 C. $-r + 3s - 3t$
 D. $-9r + 9s - 7t$

- 47 What is the slope of the line graphed below?



A. -4
 B. $\frac{2}{5}$
 C. $\frac{3}{2}$
 D. $\frac{5}{2}$

- 48 When $y = -3x + 4$ is graphed, the value 4 represents which of the following?
- A. the slope of the line
 B. the y-coordinate of the y-intercept
 C. the x-coordinate of the y-intercept
 D. the quadrant in which the line lies

- 49 Which best describes the graph of $y = -5x^2 + 2$?

A. constant
 B. nonlinear
 C. increasing
 D. linear

- 50 Which ordered pair is a solution of $y = -x^2 - 1$?

A. $(-3, 8)$
 B. $(1, 0)$
 C. $(2, -5)$
 D. $(-2, -3)$

- 51 What is the rule for the linear function represented in the table?

x	y
-3	-11
-2	-6
1	9
2	11

A. $f(x) = 3x - 2$
 B. $f(x) = 2x - 5$
 C. $f(x) = 5x + 4$
 D. $f(x) = x - 10$

- 52 Which of the following is the probability of getting a 2 or 4 on a single roll of a six-sided number cube?

A. 83.3%
 B. 66.7%
 C. 33.3%
 D. 16.7%

- 53** Which steps could be used to solve the equation $\frac{3}{4}x + 8 = 17$?
- A.** Subtract 8 from both sides, then divide both sides by the reciprocal of $\frac{3}{4}$.
 - B.** Subtract 8 from both sides, then multiply both sides by the reciprocal of $\frac{3}{4}$.
 - C.** Multiply both sides by the reciprocal of $\frac{3}{4}$, then subtract 8 from both sides.
 - D.** Divide both sides by 3, multiply both sides by 4, and subtract 8.

- 54** Which of the following rules shows the relationship between x and y in the table?

x	y
-4	16
-1	1
0	0
2	4
5	25

- A.** $y = 3x - 2$
- B.** $y = -4x$
- C.** $y = x^2$
- D.** $y = 3x$

- 55** Tori collected data on the ages and heights of a random sample of 5th-, 7th-, and 9th-grade students at her school. She plotted the data points on a scatterplot. What relationship between age and height is likely seen on the scatterplot?

- A.** positive correlation
- B.** negative correlation
- C.** no correlation
- D.** both positive and negative correlations

- 56** Mr. Chang's science class of 27 students divides into two groups for an experiment. The first group has 5 fewer students than the second group. How many students are in each group?

- A.** 4 and 23
- B.** 8 and 19
- C.** 11 and 16
- D.** 12 and 15

- 57** Let n represent the position of a number in the following arithmetic sequence.

2, 4, 6, 8, ...

Which expression can be used to find any term in the sequence?

- A.** $2n$
- B.** $\frac{1}{2}n$
- C.** $\frac{3}{2}n$
- D.** $n + \frac{1}{2}$

58 Maria used a local telephone directory to randomly choose names of people to survey regarding a proposed new cell phone law. She found 10 people home. All 10 said they supported the law. Which is the best explanation for why her conclusion might not be valid?

- A. The sample was not representative of all of the people in her town.
- B. The sample size was too small.
- C. The survey population was too large.
- D. The survey was conducted by telephone.

59 A wrapping paper cardboard tube is the shape of a cylinder. Aiden covers the ends of the cylinder and uses it on a model he is building for the science fair. The volume of air in the cylinder is 64 cubic inches. Aiden needs to create another cylinder for his model. It will have a radius and length that are half the size of the wrapping paper tube. What will be the volume of the second cylinder?

- A. 12 in.³
- B. 8 in.³
- C. 6 in.³
- D. 3 in.³

60 A micrometer is equal to 1×10^{-6} meter. Which expression represents this number in standard notation?

- A. 0.0000001
- B. 0.000001
- C. 0.00001
- D. 1,000,000

61 At a skateboard factory, the workers can produce an average of 100 polyurethane wheels every 5 minutes. At this rate, about how long will it take to complete a case of 12,000 wheels?

- A. 8 hours
- B. 10 hours
- C. 12 hours
- D. 15 hours

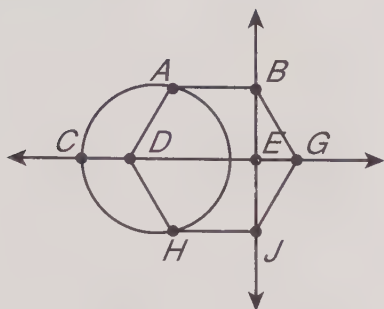
62 A soccer supply store keeps sales records of the clothing purchased at the store. The most popular sock colors from this year are shown in the table below.

Color of Socks	Pairs Sold
Black	34
White	24
Yellow	18
Purple	14
Gray	10

If the trend continues, what is the probability that the next pair of socks purchased will be yellow?

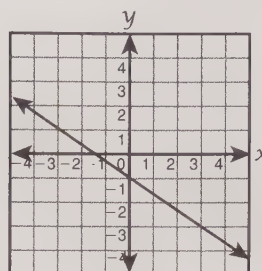
- A. 0.32
- B. 0.18
- C. 0.08
- D. 0.05

Use this figure for questions 63–65.
Hexagon $ABGJHD$ is a regular hexagon.

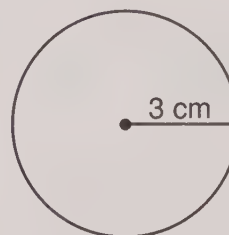


- 63 What is the measure of angle DAB ?
- A. 40°
 - B. 90°
 - C. 120°
 - D. 140°
- 64 Segment HJ has what relation to the circle set?
- A. It is a semicircle.
 - B. It is a chord.
 - C. It is a radius.
 - D. It is tangent to the circle.
- 65 At which point below does the top semicircle intersect the hexagon?
- A. point H
 - B. point A
 - C. point E
 - D. point C

- 66 What are the coordinates of the y -intercept of the line graphed below?



- A. $(0, -1)$
 - B. $(-1, 0)$
 - C. $(0, -\frac{3}{2})$
 - D. $(-\frac{3}{2}, 0)$
- 67 What would the area of the circle be if the radius were tripled?
Use 3.14 for π .



- A. 56.52 cm^2
- B. 63.585 cm^2
- C. 84.78 cm^2
- D. 254.34 cm^2

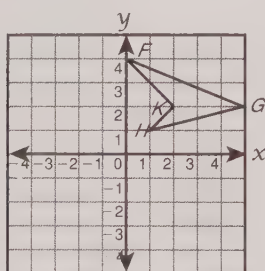
- 68 What is the probability of rolling a number cube and getting a 6 three times in a row?

- A. $\frac{1}{6} \times \frac{1}{6} \times \frac{1}{6}$
 B. $\frac{1}{6} \times \frac{1}{6} \times \frac{1}{3}$
 C. $\frac{1}{6} \times \frac{1}{6}$
 D. $\frac{1}{6} \times 3$

- 69 Which is the best estimate of the length of each side of a square that has an area of 80 cm^2 ?

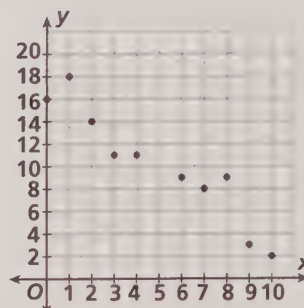
- A. 8 cm
 B. 9 cm
 C. 10 cm
 D. 11 cm

- 70 What is the x -coordinate of point H after the quadrilateral is translated 3 units left and 4 units up?



- A. -4
 B. -2
 C. 0
 D. 3

- 71 If the data continues on its current trend, what will be the approximate value of y when the value of x is 12?



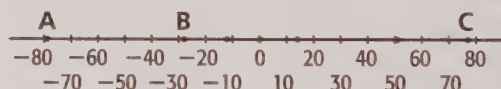
- A. -16
 B. -8
 C. -1
 D. 7

- 72 Which inequalities have the solution $s > 4$?

- | | |
|-----------------------|----------------------|
| Inequality I | Inequality II |
| $6s > -24$ | $s - 8 \leq -12$ |
| Inequality III | Inequality IV |
| $-s > -4$ | $6 + s \leq 10$ |

- A. All of them
 B. None of them
 C. All but D
 D. Inequalities B and C

- 73 What is the approximate midpoint between points A and C?



- A. -5
 B. point B
 C. 0
 D. 10

- 74 Which square root is between 4 and 6?

A. $\sqrt{12}$
 B. $\sqrt{16}$
 C. $\sqrt{21}$
 D. $\sqrt{40}$

- 75 What is the missing term in the input/output table?

x	$y = 6x - 11$
-2	-23
0	-11
2	?
4	13

A. -5
 B. -1
 C. 1
 D. 7

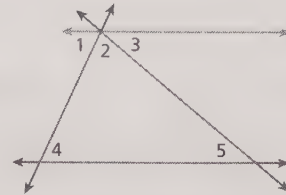
- 76 Write 0.000056 in scientific notation.

A. 5.6×10^{-4}
 B. 5.6×10^5
 C. 5.6×10^4
 D. 5.6×10^{-5}

- 77 How many three-digit numbers can you make out of the digits 1, 2, and 6?

A. 6
 B. 12
 C. 18
 D. 24

- 78 The sum of which angles measures 180° ?



A. $\angle 1$, $\angle 2$, and $\angle 3$
 B. $\angle 1$, $\angle 2$, and $\angle 5$
 C. $\angle 2$, $\angle 4$, and $\angle 5$
 D. All of the above

- 79 Which algebraic expression represents the phrase "double a number, then decrease by four?"

A. $4x - 2$
 B. $4 - 2x$
 C. $2x - 4$
 D. $2 - 4x$

- 80 If $\frac{x}{12} = \frac{7}{3}$, what is the value of x ?

A. 14
 B. 28
 C. 2.5
 D. 84

- 81 Which of the following is NOT an arithmetic sequence?

A. 2, 5, 8, 11, ...
 B. 1, 2, 3, 4, ...
 C. 29, 21, 13, 5, ...
 D. 81, 27, 9, 3, ...

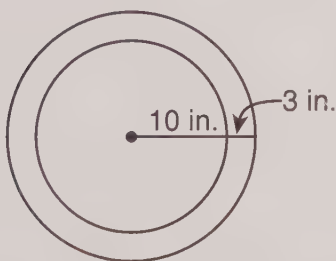
- 82 Which would NOT be a good random sample from a school?

A. The first 50 students to get to school
B. The 1st, 5th, 10th etc. students, when arranged by birthday
C. The 3rd, 8th, 13th etc. students, when arranged by last name.
D. Every 5th student to come into school.

- 83 Use the order of operations to simplify.
 $12 + 3(5 + 7) - 2^3$

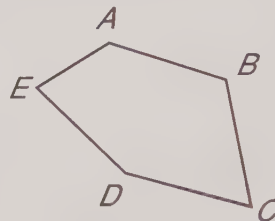
A. 48
B. 40
C. 112
D. 42

- 84 A frame 3 inches wide surrounds a circular mirror. What is the circumference of the mirror WITHOUT the frame? Use 3.14 for π .



A. 21.76 inches
B. 43.96 inches
C. 62.80 inches
D. 212.66 inches

- 85 What is the sum of the angle measures of this figure?



A. 90°
B. 180°
C. 360°
D. 540°

- 86 $\sqrt{30}$ is between which 2 consecutive integers?

A. 4 and 5
B. 5 and 6
C. 5 and 7
D. 6 and 7

- 87 In the linear equation $y = 4x + 2$, the value 2 represents which of the following?

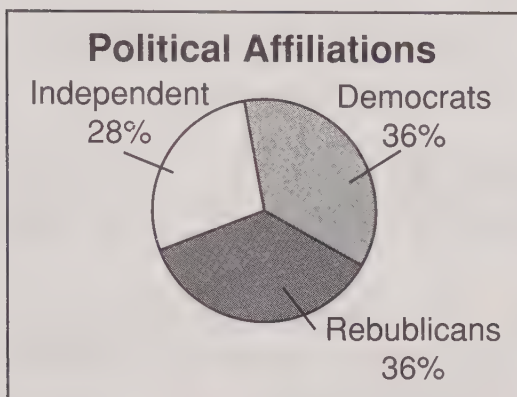
A. The slope of the line
B. The y-coordinate of the y-intercept
C. The x-coordinate of the y-intercept
D. The quadrant in which the line lies

- 88 Two sides of an isosceles triangle are 17" and 20". What is the perimeter of the triangle?

A. 23"
B. 54"
C. 57"
D. It can be either 54" or 57"

Short-Response: Show your work for each question.

- 89** The circle graph below gives the percentages of registered voters that identify themselves with each of the shown political affiliations. If there are 1,000 registered voters in Westport, how many identify themselves as Democrats?



- 90** Draw the reflection of the pentagon over a horizontal line.

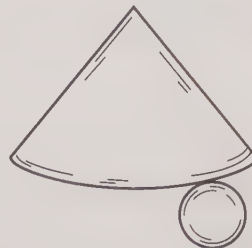


- 91** At what point does the graph of the line $y = -\frac{2}{3}x + 5$ cross the y -axis?

- 92** Find the distance between these two points.

(1, 0) and (7, 8)

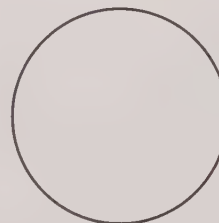
- 93** The net below can be folded into what three-dimensional figure?



- 94** What are the odds in favor of rolling an even number on a six-sided number cube?

- 95** Is $\sqrt{225}$ a rational or irrational number? Explain.

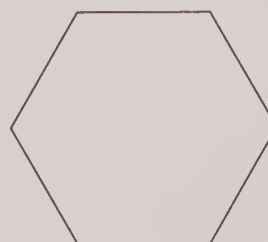
- 96** Draw a chord that is not a diameter on the circle below.



- 97** What is the value of p in the following equation?

$$2p - 4 = p + 13$$

- 98** How many times will the figure show rotational symmetry within one full rotation?



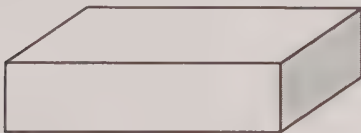
Extended-Response: Show your work for each question.

- 99 Explain each step you would use to solve and graph the inequality $\frac{3x}{5} + 2 = -1$.

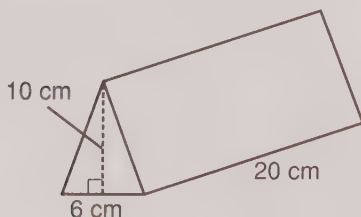
- 100 John left home and drove north for 3 miles, east for 2 miles, north for 4 miles, and then east for 3 miles. At that point, approximately how far was John from home? Use a diagram to explain your answer.

- 101 Compare the surface area of a cylinder with a radius of 3 centimeters and a height of 20 centimeters to that of a cylinder with a radius of 20 centimeters and a height of 3 centimeters.

- 102 A gift box in the shape of a rectangular prism is 2 feet long, 18 inches wide, and 6 inches deep. If the cardboard weighs about 0.05 ounces per square inch, what is the approximate weight of the box?



- 103 Compare the volume of the prism below to that of a cylinder with a diameter of 8 centimeters and a height of 20 centimeters.



- 104 The price of a certain personal computer fell 15% over a two-year period. The price at the end of the period was \$763.30. Explain how to find the price of the computer at the beginning of the two-year period.

- 105 Write an equation that models the relationship between the cost, c , for h hours of plumbing service. The relationship is shown in the table. Explain your reasoning.

hours (h)	1	2	3	4
cost (c)	\$100	\$130	\$160	\$190

- 106 Explain how to find the area of a 15,000-square-centimeter tablecloth in square meters.

- 107 Twice a number added to another number is 15. The sum of the two numbers is 11.

Write a system of equations that represents the above information. Solve the system to find the two numbers.

- 108 Draw a bar graph to represent the information in the table below.

Weather Condition	Sun	Mostly Cloudy	Rain	Snow
Number of Days	5	8	3	2



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